“Calamp: soluciones de control de flotas y localización” Martes 23 - 10:00h

4 de febrero 2015

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CALAMP Overview

Agenda:

1. CalAmp: Solución de control de flotas y localización.
2. Aplicaciones principales.
3. Gama de producto.
4. Especificaciones, Interfaces básicas, gpios, OBDII, CAN,...
5. Herramientas de programación y de gestión.

CALAMP Overview

Industry leader in Mobile Resource Management (MRM) and Machine to Machine (M2M) communications

CALAMP VITALS

- Proven leader in MRM and M2M space
- Founded in 1981; publicly traded since 1983 (NASDAQ: CAMP)
- Headquartered in Oxnard, California; 8 offices worldwide
- Annual device run rate: 1.5M+ units
- More than 3 million devices under management on our platforms
- 400K+ unique software application subscribers

CALAMP Overview

connecting tomorrow today

CalAmp's Current Positioning in the M2M Space

Focused on enterprise customers looking to optimize business processes or create novel offerings through M2M technologies/services, often greenfield in nature

M2M Devices	Communications Network	Cloud-based Platforms & Services	Software Applications
Be the global leader in M2M products with scale, breadth, flexibility and best value	Partner with leading network providers and leverage their access to fortune 1000 companies globally	Best in class offerings with scale and flexible business model, delivered reliably and securely	Flexible business model based on applications from CalAmp, customer or independent 3rd party

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CALAMP Overview

Attractive Targeted Industries

Solutions in targeted markets optimize operations by collecting, monitoring and efficiently reporting business-critical intelligence from high-value remote assets

Wireless Networks / Vertical M2M Solutions

TRANSPORTATION

- Asset Tracking
- Rail
- Heavy Equipment
- Field Service

ENERGY

- Oil & Gas
- Water & Wastewater
- Utility Smart Grid
- Mobile Workforce

GOVERNMENT

- Service Fleets
- First Responders
- Emergency Services
- Security

AUTOMOTIVE

- Vehicle Finance
- Stolen Vehicle Recovery
- Remote Car Start
- Rental Fleets

Mobile Resource Management / M2M Devices

The broadest portfolio of devices and advanced device management tools leveraged by MRM/fleet management and M2M application solution providers worldwide; trusted and highly recommended by global top tier mobile network operators

CALAMP Overview

- Broad, multi-tiered device portfolio
- Intelligent, highly configurable & differentiated offering
- Efficient communications
- Extensive remote management & control

VEHICLE TRACKERS

TRAILER & ASSET TRACKERS

VEHICLE GATEWAYS

PEG PULS

ON-BOARD DIAGNOSTICS DEVICES

ANDROID MOBILE DATA TERMINALS

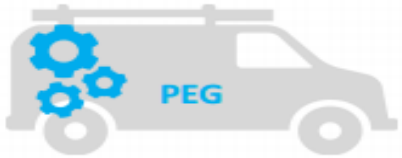
LINUX ROUTERS & GATEWAYS

CALAMP Overview

Embedded Intelligence & Device Management

DEVICE EMBEDDED INTELLIGENCE

- Flexible and expandable event monitoring & reporting
- Unique behavior specific to application or customer
- Visibility into actionable events/exceptions
- User application space across portfolio



- LOGGING
- SPEED
- COMMUNICATIONS
- ZONES
- DRIVER BEHAVIOR
- TIME CLOCK
- POWER MANAGEMENT
- COUNT

DEVICE & SOLUTION LIFECYCLE MANAGEMENT

- Remotely manage & configure devices
- Manage OTA firmware updates
- Automated device provisioning & activation
- Front line diagnostics; logistics

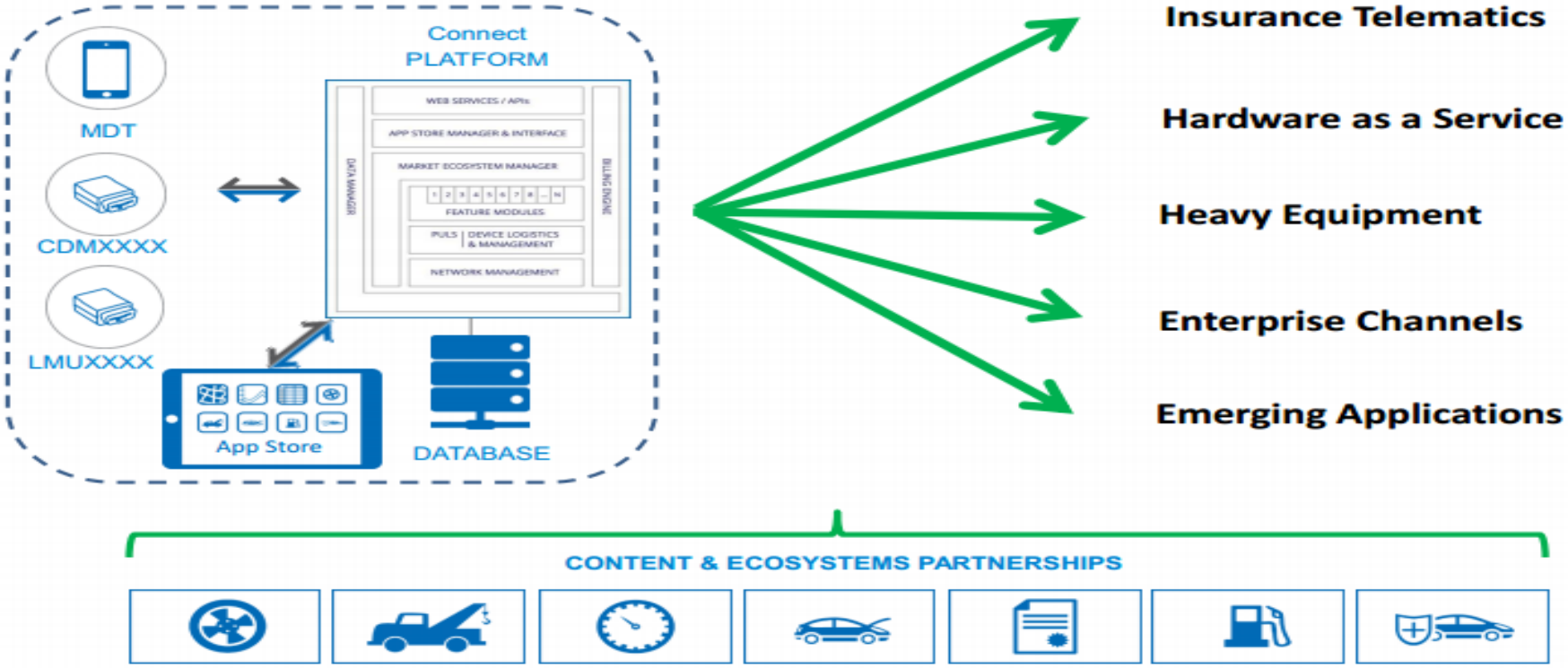
- AUTO CONFIG
- PERIODIC CHECK-IN
- DIAGNOSTICS
- CONFIG MGMT
- OTA FW UPDATES
- ONE-TO-ONE
- ONE-TO-MANY

BENEFITS

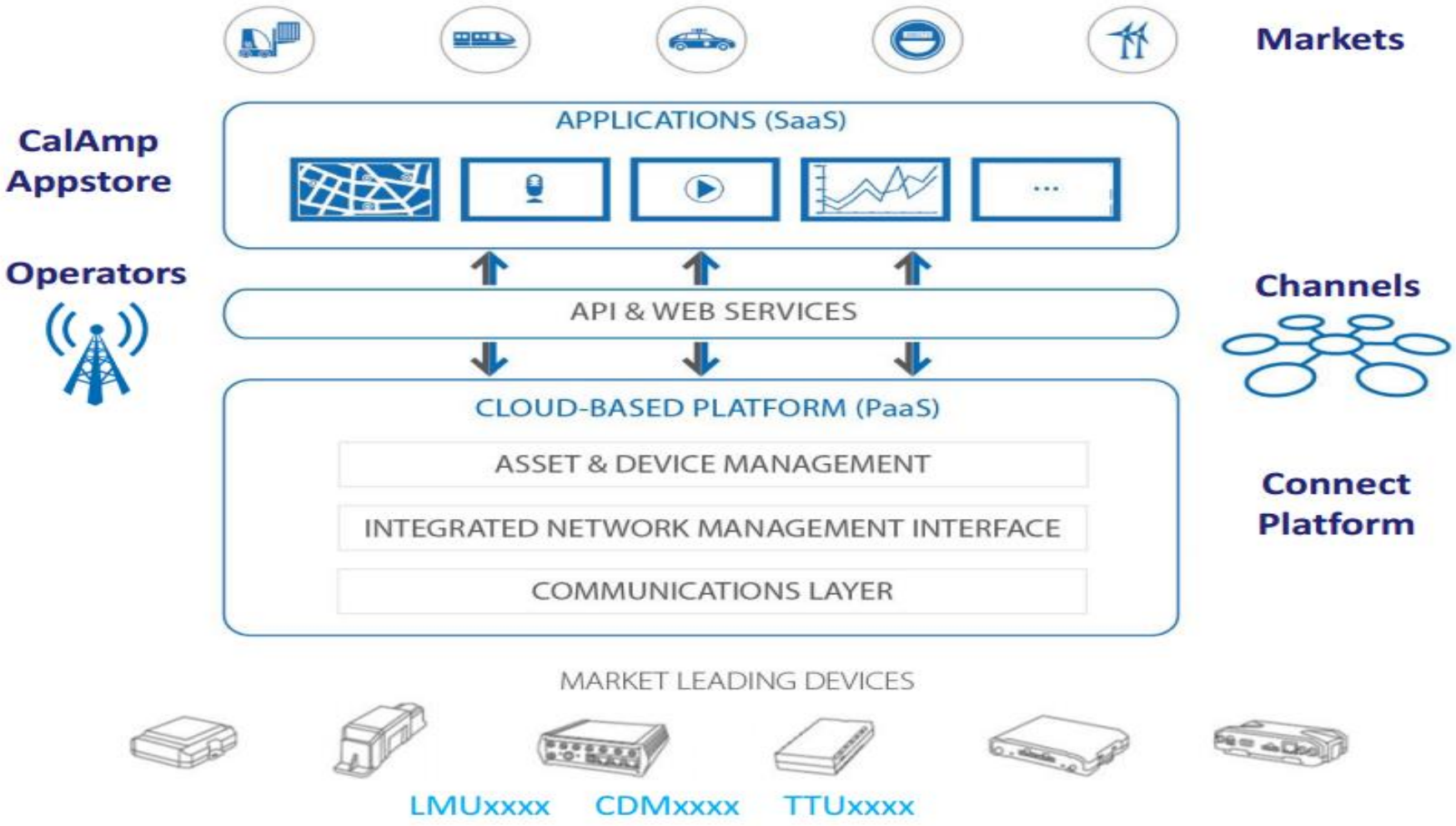
- Supported by all devices – mixed assets/fleets
- Common protocol across portfolio
- Highly configurable to address multiple verticals
- Full lifecycle management for mass deployment
- Dynamic updates respond to field conditions

CALAMP Overview

Strategic Thrusts Leveraging Core Investments



CALAMP Overview



CALAMP Overview

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Proven Expertise in High Value M2M Solutions

TRANSPORTATION

- CAT
- PARSONS
- AnsaldoSTS

ENERGY

- Pepco Holdings Inc
- CFE Comisión Federal de Electricidad
- Chesapeake Energy

AUTOMOTIVE

- Directed Electronics, Inc.
- Credit Acceptance — We change lives!
- Holmes Motors

GOVERNMENT

- City of San Diego, State of California
- Mecklenburg County, North Carolina
- Municipality of Anchorage

MRM Products

- NAVMAN
- Fleetmatics
- Numerex
- Telogis
- masternaut — mobile resource management

CALAMP Overview

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Use Case: Heavy Equipment

Flexible and expandable industrial grade communication and management tools for locating, tracking and managing high value fleet assets

PROVEN TELEMATICS SOLUTIONS

- Prevent theft and control inventory
- Verify usage data and improve asset utilization
- Monitor driver activity and safety
- Reduce fuel costs
- Eliminate unauthorized utilization of assets
- Track engine hours to optimize maintenance costs

VEHICLE GATEWAYS

CAT®

CalAmp is providing Caterpillar with ruggedized wireless routers to enable vital data communications for equipment deployed around the globe

CALAMP Overview

connecting tomorrow today

Use Case: Usage-Based-Insurance

Reduce costs and improve vehicle tracking and monitoring reliability

PROVEN SOLUTION

- Wide-scale deployment in consumer vehicles
- Tracks vehicles and monitors driving behavior
- Collects and transmits speed, braking, cornering, and impact data
- Enables wide-range consumer automotive, UBI, telematics, auto rentals and other tracking/monitoring applications

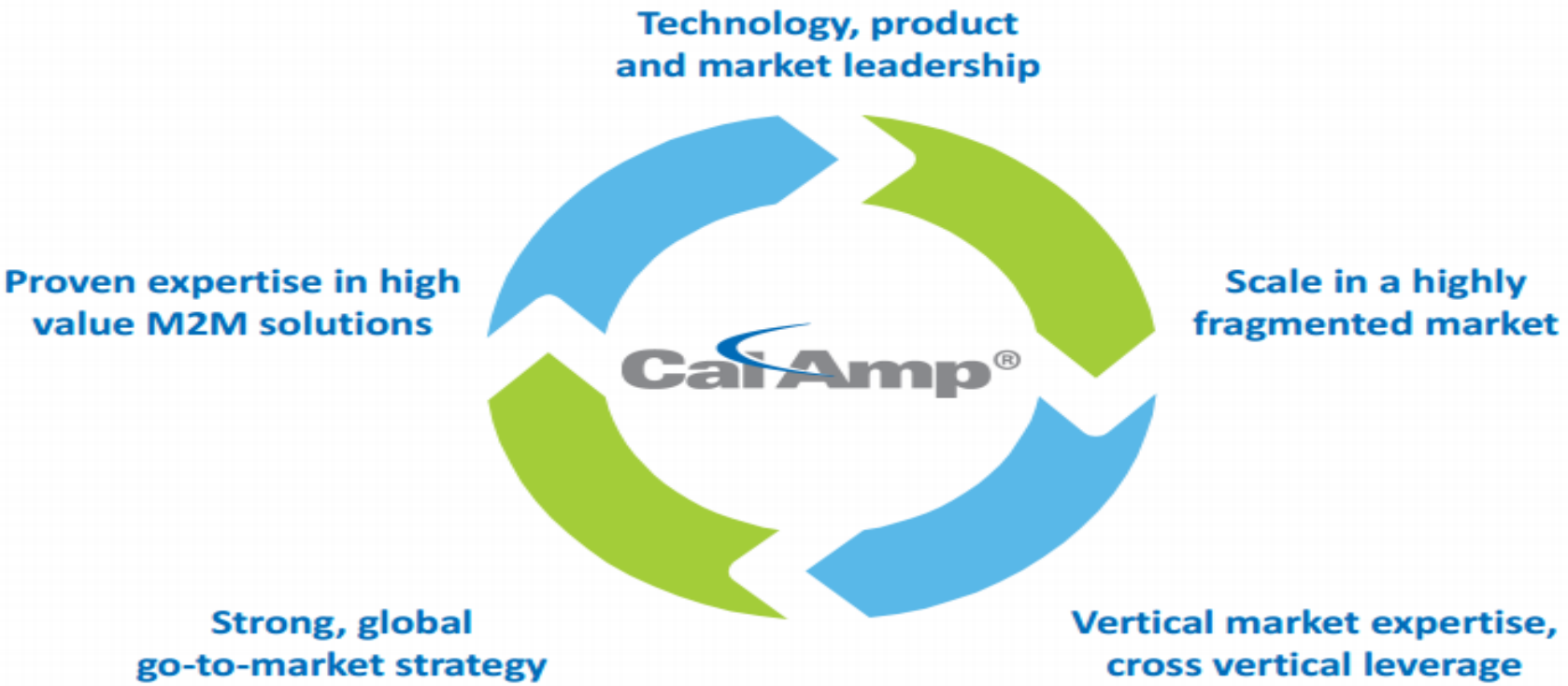
ON-BOARD DIAGNOSTICS DEVICES

MODUS | HIMEX Game Changing UBI | RAC

Modus, Himex, The RAC and their customers rely on CalAmp for more accurate driver risk rating, more efficient claims processing and enhanced customer experience

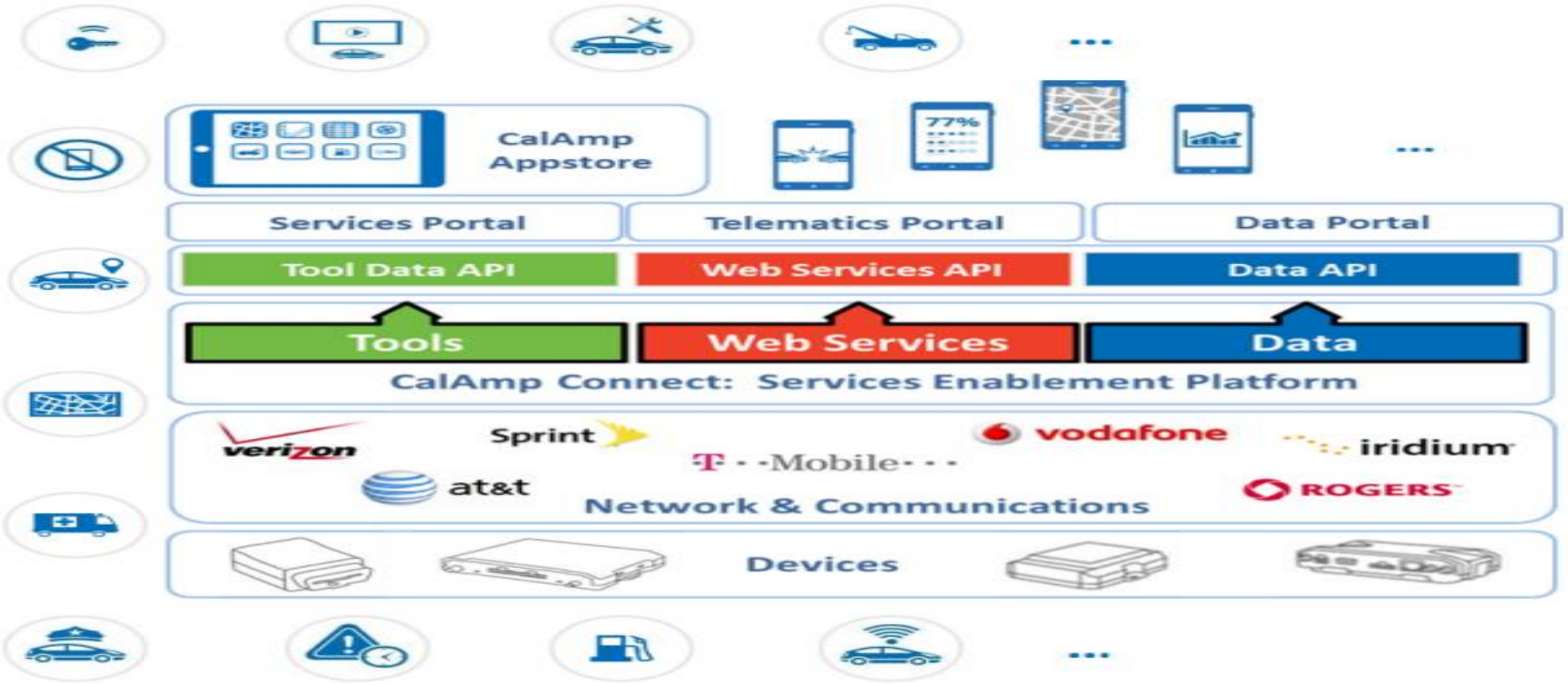
CALAMP Overview

Our Competitive Strengths – A Virtuous Cycle



CALAMP Overview

Partnering Strategies & Models



CALAMP Gama de producto

Localización de activos

ATU-620

The ATU-620 is a battery-operated asset tracking product designed for reliable, multi-year deployments.

TTU-700 SERIES

The TTU-700 is a battery operated non-rechargeable trailer tracking product designed for reliable, multi-year deployments.

TTU-1200 SERIES

The TTU-1200 rechargeable battery pack trailer tracking product is designed for reliable, multi-year deployments.

TTU-2820 SERIES

The TTU-2820 rechargeable battery pack trailer tracking product is designed for reliable, long-term deployments.

DIODE ELECTRÓNICA

CALAMP Gama de producto

8 Bit Class of Products

- 8 bit CPU (ST Micro STM8S207)
- Lower priced products serving:
  - Asset tracking
  - 3rd world fleets
  - SVR (Stolen Vehilce Recovery)
  - Buy Here/Pay Here
- Very often use the same platform with variants on enclosure, batteries, cabling, antennas.

CALAMP Gama de producto

ATU-600 Series (Package Tracker)

ATU-620

The ATU-620 is a battery-operated asset tracking product designed for reliable, multi-year deployments.

Wireless Technologies

- GPRS, CDMA 1X, HSPA and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal Antenna Configuration

Key Features

- 3 or 6 pack AA (1.5v) Batteries: 1 or 2 Year Life Cycle w/1 Message per Day
- IP67 Sealed Enclosure
- Base PEG8™ Behavioral Scripting 3 Axis Accelerometer for Directional Motion Sense and Tilt
- Battery Voltage Monitoring
- Ultra low Power Sleep Modes (to <1mA)
- 2,000 Buffered Message Log
- 4 Programmable Circle or Square Geo-fences
- PULS ™ OTA Programming

CALAMP Gama de producto

TTU-700 Series (Trailer Tracker)

Wireless Technologies

- GPRS, CDMA 1X, HSPA and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal Antenna Configurations

Key Features

- 5000 Message Cycles on Fully Charged Field Replaceable Battery
- 7 Years Life Cycle w/1 Message per Day
- IP67 Sealed Enclosure
- Base PEG8™ Behavioral Scripting w/8 Bit Application Processor
- Built In Motion Sensor
- 57Ah Battery
- Ultra low Power Sleep Modes (to <1mA)
- 2,000 Buffered Message Log
- 4 Programmable Circle or Square Geo-fences
- PULS ™ OTA Programming

CALAMP Gama de producto

TTU-1200 Series (Trailer Tracker)

Wireless Technologies

- GPRS, CDMA 1X, HSPA and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal Antenna Configurations

Key Features

- 500 Message Cycles on Fully Charged Re-Chargeable Battery
- 6 Month Life Cycle w/1 Message per Day
- IP66 Sealed Enclosure
- Base PEG8™ Behavioral Scripting w/8 Bit Application Processor
- 3 Axis Accelerometer for Directional Motion Sense and Tilt
- 3.8Ah Battery
- Ultra low Power Sleep Modes (to <1mA)
- 3 Inputs / 3 Outputs
- 2,000 Buffered Message Log
- 4 Programmable Circle or Square Geo-fences
- PULS ™ OTA Programming

CALAMP Gama de producto

Control de flotas, 8 bits

LMU-300 SERIES

The LMU-300 is an economical, full-featured vehicle tracking product designed for covert and reliable installation in automobiles.

LMU-400 SERIES

The LMU-400 is an economical, full-featured vehicle tracking product designed for easy

LMU-700 SERIES

The LMU-700 is an economical, full-featured vehicle tracking product designed for easy and reliable installation in automobiles.

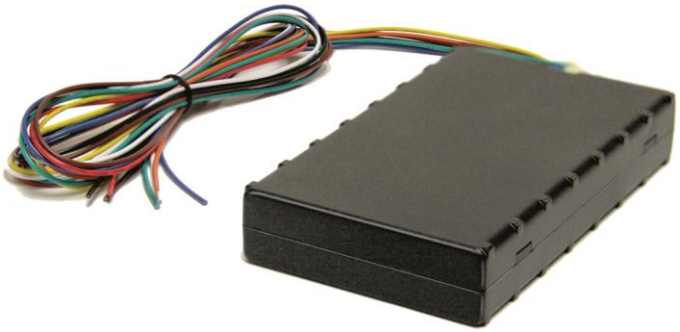
LMU-800 SERIES

The LMU-800 is an economical, full-featured vehicle tracking product designed for easy and reliable installation in automobiles and includes battery back-up.

DIODE ELECTRÓNICA

CALAMP Gama de producto

LMU-300 Series



Key Features

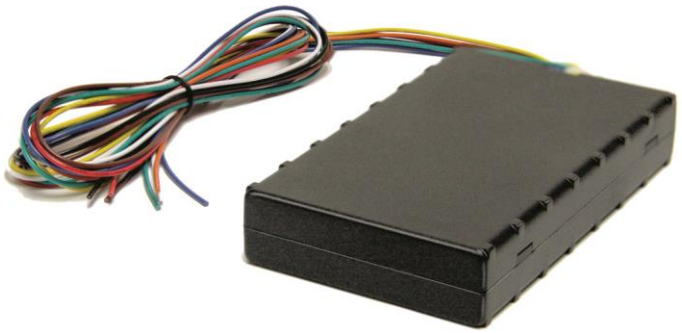
- Base PEG8™ Behavioral Scripting w/8 bit application processor
- Ultra low Power Sleep Modes (to <1mA)
- Built-in Harness
- Backup Battery Option
- Optional Motion detects
- Optional 1-bit bus
- 1-2 inputs, 1 Outputs (built in harness)
- 2,000 Buffered Message Log
- 10 Circle or Square Geo-fences
- PULS ™ OTA Programming

Wireless Technologies

- GPRS and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal Antenna Configuration

CALAMP Gama de producto

LMU-400 Series



Location Technology
50 channel GPS (with SBAS)
SBAS: WAAS, EGNOS, MSAS, GAGAN

Location Accuracy
2.0 meter CEP (with SBAS)

Tracking Sensitivity
-162dBm

Acquisition Sensitivity
-147dBm

AGPS Capable

Operating Voltage
12 and 24 volt vehicle systems

UDP and SMS-based messaging

Internal GSM and GPS antennas

Super sensitive GPS (-162 dBm)

Internal back-up 200 mAh battery

Ultra-low power sleep mode (<2mA)

Internal buzzer

Wireless Technologies

- HSPA/GPRS and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal Antenna Configuration

CALAMP Gama de producto

LMU -700/800 Series (EconoTracker)

Wireless Technologies

- HSPA/GPRS and SMS Messaging
- Super Sensitive GPS (-162 dBm Tracking)
- Internal Antenna Configuration

LMU 800 ¡

- Bateria de Back up 200mAh
- Internal Antenna Configuration

Operating Voltage
12 and 24 volt vehicle systems

Optional Features/Functions

Starter interrupt harness

OBDII easy install harness

External backup battery

Serial programming cable

CALAMP Gama de producto

LMU-900 Series (EconoTracker)

GPRS/EDGE/HSPA and CDMA 1xRTT packet data, UDP and SMS

Super sensitive GPS (-162 dBm)

Ultra-low power sleep mode (<2mA)

3-axis accelerometer for motion sense and tilt

4 inputs and 4 outputs

Voltage monitoring and low battery notification

2,000 buffered messages

Wireless Technologies

- GPRS, CDMA 1X, HSPA and SMS Messaging
- Super Sensitive GPS (-160dBm Trackir
- Internal or External Antenna Configurations

Optional Features/Functions

Starter interrupt harness

OBDII easy install harness

External GPS and cellular antennas

Internal GPS and cellular antennas

External backup battery

Serial cable

CALAMP Gama de producto

LMU-1100 Series (Recreational Vehicle)

Wireless Technologies

- GPRS and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal Antenna Configurations

Key Features

- Base PEG8™ Behavioral Scripting w/8 bit application processor
- 3 Axis Accelerometer for Directional Motion Sense and Tilt
- 1000mAh Battery Back-up
- Ultra low Power Sleep Modes (to <1mA)
- Sealed Case with Built-In Harness
- 1 Input/1 Output/1 1-wire® Bus
- 2,000 Buffered Message Log
- 10 Programmable Circle or Square Geo-fences
- PULS ™ OTA Programming

CALAMP Gama de producto

32 Bit Products

- Cortex 32 bit CPU
- More robust products serving:
  - Fleet tracking (e.g., school bus, transportation, delivery, service vehicles, public works)
  - Asset tracking
  - Insurance
- Supports:
  - serial based data devices (MTDs, Garmin, Barcode readers, etc)
  - vehicle bus data: OBDII CAN std, hvy duty JBus/CAN
  - accelerometer based driver behav./impact log
  - Dual mode: cell, Iridium, WiFi, and Bluetooth

CALAMP Gama de producto

LMU-2100 SERIES

LMU-2600 SERIES

The LMU-2600 fleet tracking unit offers leading edge technology including a 3-axis accelerometer for measuring driver behavior and vehicle impacts while offering the high reliability fleet customers demand.

LMU-2700 SERIES

The LMU-2700 fleet tracking unit offers leading edge technology including a new 3-axis accelerometer for measuring driver behavior and is ideal for usage-based insurance applications.

LMU-3030

The LMU-3030 is an ideal solution for automotive insurance, driver behavior management, auto rental and automotive applications when access to the vehicle diagnostics interface (OBD-II) is required.

DIODE ELECTRÓNICA

CALAMP Gama de producto

LMU-4200 SERIES

CalAmp's flagship LMU-4200 product has the features, expandability, and flexibility with the intelligence to meet all customer's ever changing needs in fleet management.

LMU-4520 SERIES

CalAmp's fully weatherproof LMU-4520 is a dual-mode location-and-messaging device that features satellite and cellular communications and a connection to the vehicles ECU.

CALAMP Gama de producto

LMU/RMU-2600 Series (Fleet Tracker)

Key Features

- Base PEG32™ Behavioral Scripting w/32 bit application processor
- 3 Axis Accelerometer (Motion, Driver Behavior, Impact log)
- Ultra low Power Sleep Modes (to <3mA)
- 20 pin Connector Harness w/Multiple Optional Harness Configurations
- 5 Inputs/3 Outputs/2 A-D /1 1-wire® Bus
- 2 Serial Ports (1 port w/switchable power)
- 20,000 Buffered Message Log
- 32 Programmable Geo-fences plus any combo of polygons up to 5400 points
- PULS ™ OTA Programming

Wireless Technologies

- GPRS, CDMA 1X, HSPA and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal or External Antenna Configurations

CALAMP Gama de producto

LMU/RMU-2700 Series(Fleet Tracke

Key Features

- Base PEG32™ Behavioral Scripting w/32 bit application processor
- 3 Axis Accelerometer (Motion, Driver Behavior, Impact log)
- **1000 mAh Battery Back-up**
- Ultra low Power Sleep Modes (to <3mA)
- 20 pin Connector Harness w/Multiple Optional Harness Configurations
- 5 Inputs/3 Outputs/2 A-D /1 1-wire® Bus
- 2 Serial Ports (1 port w/switchable power)
- 20,000 Buffered Message Log
- 32 Programmable Geo-fences plus any combo of polygons up to 5400 points
- PULS ™ OTA Programming

Wireless Technologies

- GPRS, CDMA 1X, HSPA and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal or External Antenna Configurations

CALAMP Gama de producto

TTU-2800 Series (Trailer Tracker)

Wireless Technologies

- GPRS, CDMA 1X, HSPA and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal Antenna Configuration

Key Features

- 500 Message Cycles on Fully Charged Re-Chargeable 3.8Ah Battery
- 6 Month Life Cycle w/1 Message per Day
- IP66 Sealed Enclosure
- Base PEG32™ Behavioral Scripting
- 3 Axis Accelerometer (Motion, Driver Behavior, Impact log)
- Ultra low Power Sleep Modes (to <1mA)
- 3 In/3 Outputs, 1 A/D, 1-bit bus, serial
- 20,000 Buffered Message Log
- 32 Circle/Square Geo-fences or 5400 pts
- PULS ™ OTA Programming

CALAMP Gama de producto

LMU-2000 Series(Driver Behavior and Fleet Management)

Key Features

- Base PEG32™ Behavioral Scripting w/32 bit application processor
- 3 Axis Accelerometer (Motion, Driver Behavior, Impact log)
- Ultra low Power Sleep Modes (to <3mA)
- **OBDII Easy Plug-on for Power**
- 200 mAh Battery Back-up
- 1 Serial Port- optional
- 20,000 Buffered Message Log
- 32 Programmable Geo-fences plus any combo of polygons up to 5400 points
- PULS ™ OTA Programming

Wireless Technologies

- GPRS, CDMA 1X, HSPA and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- Internal Antenna Configurations

CALAMP Gama de producto, LMU3030

LMU-3030

The LMU-3030 is an ideal solution for automotive insurance, driver behavior management, auto rental and automotive applications when access to the vehicle diagnostics interface (OBD-II) is required.

OBD-II Interface
J1850 PWM, J1850 VPW, ISO-9141-2, ISO-14230, KWP2000, ISO-15765, CAN

Outputs
None

Bluetooth
Bluetooth 4.0 Dual Mode (optional fit)

Status LEDs
GPS, OBD-II and cellular

Operating Voltage
9-16 VDC Vehicle Systems

Internal Battery
200mAH

Sleep Mode

Temperature
-30° to +75° C (operating); -40° to +85° C (storage)

Humidity
95%RH @ 50° C non-condensing

Shock and Vibration
SAE J1455

EMC/EMI
SAE J1113; FCC–Part 15B; Industry Canada

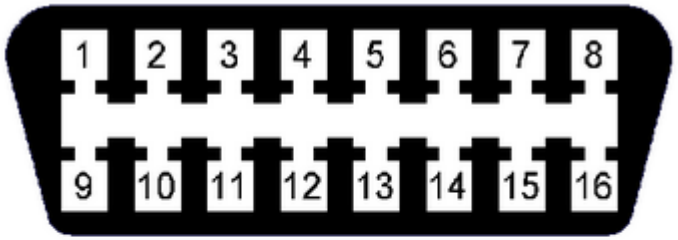
RoHS Compliant

CALAMP Gama de producto, LMU3030

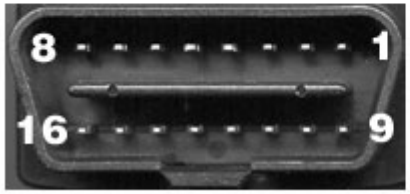
LMU-3030™ Connectors

Pin	Signal Name	Description
1	Make/Model Specific	Vendor Option
2	Bus+ Line	SAE-J1850 PWM and SAE-1850 VPW
3	Make/Model Specific	Vendor Option
4	Chassis Ground	Ground
5	Signal Ground	Ground
6	Can High	ISO 15765-4 and SAE-J2284
7	K line	ISO 9141-2 and ISO 14230-4
8	Make/Model Specific	Vendor Option
10	Bus- Line	SAE-J1850 PWM and SAE-1850 VPW
11	Make/Model Specific	Vendor Option
14	Can Low	ISO 15765-4 and SAE-J2284
15	L line	ISO 9141-2 and ISO 14230-4
16	Battery Power	Power

Connector on Vehicle side



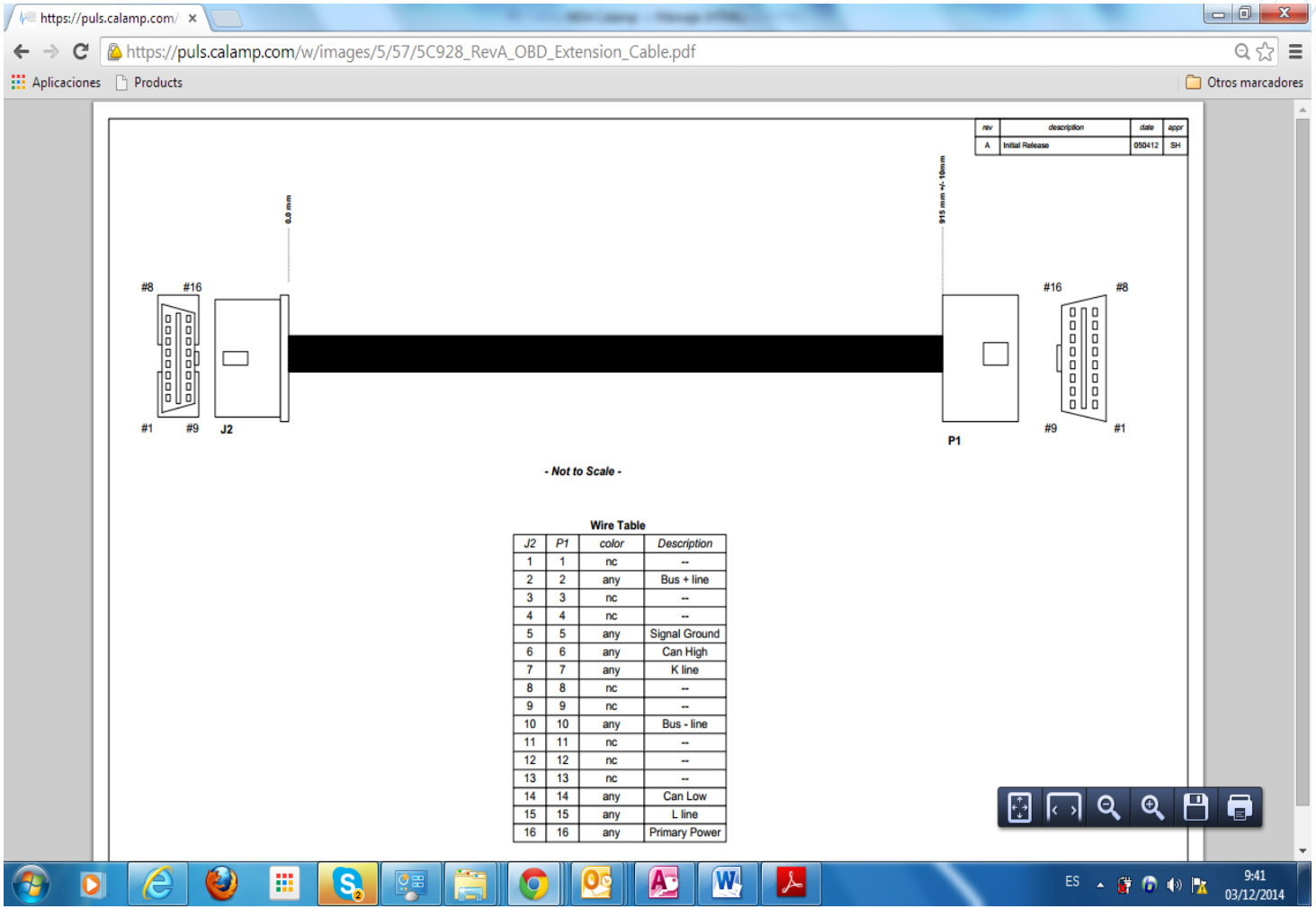
Connector on LMU-3030 side



DIODE ELECTRÓNICA

CALAMP Gama de producto, LMU3030

LMU-3030™ accesorio- Cable bus CAN



DIODE ELECTRÓNICA

CALAMP Gama de producto, LMU3030

I/O Descriptions

The LMU-3030™ provides the following Inputs for scripting purposes, but there are no selectable inputs on the device**Digital Inputs**Input 0: Engine ON

Input 1: Motion Sensor (low = no motion, high = motion)

Input 2: Power State

Input 3: Vbatt Low

Input 4: Vin Active (On LMU-3030 use Input 4 for Ignition Input Wake Up Monitor instead of Input 0)

Analog to Digital Inputs

A/D 0: Vin

A/D 1: uP Temp

A/D 2: Vref

A/D 3: Battery

A/D 4: Impact

Outpus

Output 4: Power Switch

Output 5: Charge Disable

3-Axis Accelerometer Input

The LMU-3030™ supports an internal 3 Axis Precision Accelerometer as one of its discreet inputs. When the LMU is moved in any direction, the associated input will be in the High state. If the LMU's accelerometer does not detect motion, then the input will be in the Low state. No external connections are required for this functionality to be operational.

CALAMP Gama de producto

LMU/RMU-4200 Series (Fleet Tracker)

Key Features

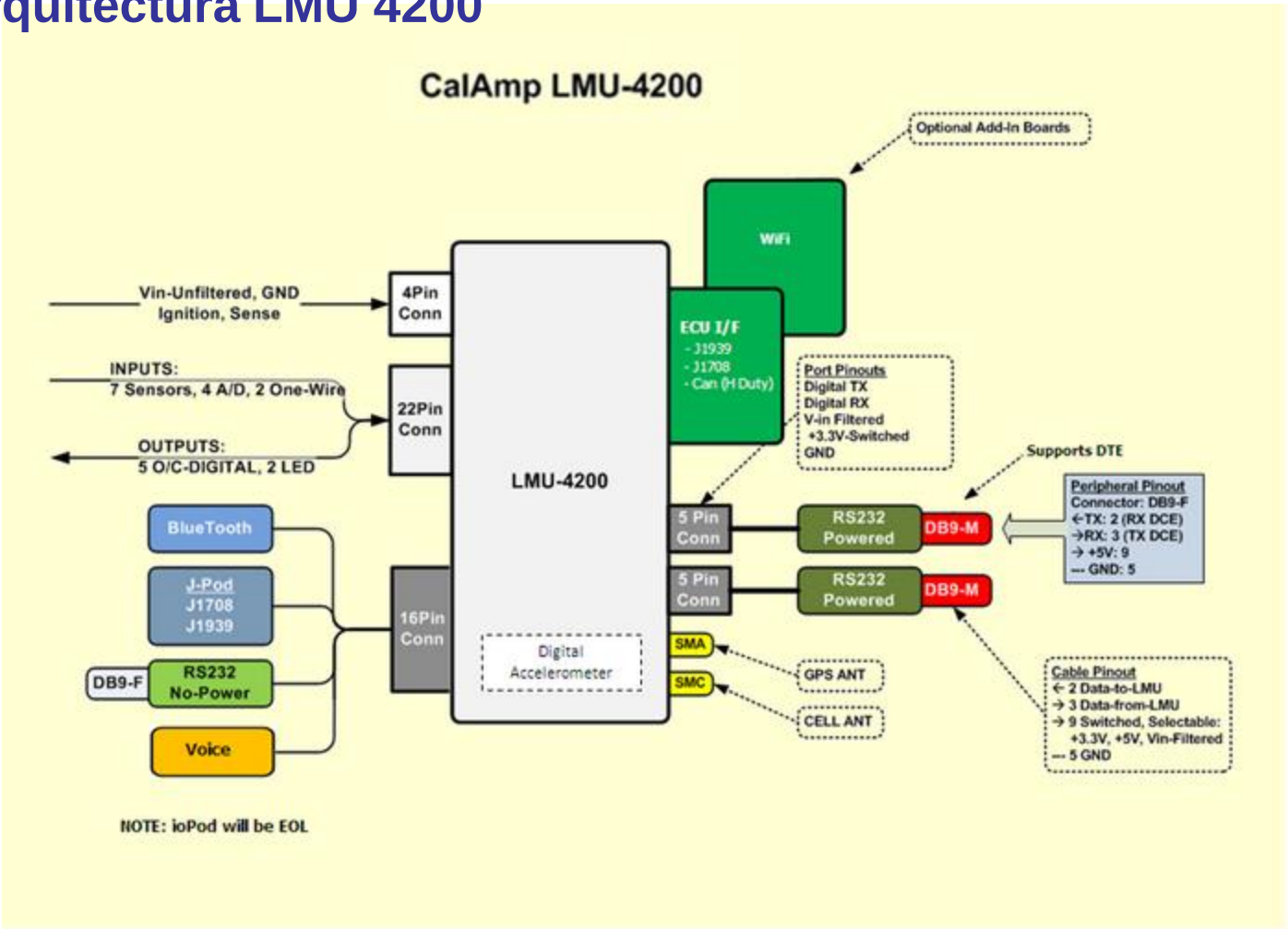
- Base PEG32™ Behavioral Scripting w/32 bit application processor
- 3 Axis Accelerometer (Motion, Driver Behavior, Impact log)
- Ultra low Power Sleep Modes (to <4mA)
- Multiple Connector Harness w/Multiple Optional Harness Configurations
- 8 Inputs/7 Outputs/4 A-D /2 1-wire® Bus
- 3 Switched Power Serial Ports
- Dual 20,000 Buffered Message Logs
- 32 Programmable Geo-fences plus any combo of polygons up to 5400 points
- PULS ™ OTA Programming

Wireless Technologies

- GPRS, CDMA 1X, HSPA, and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- External Antenna Configuration

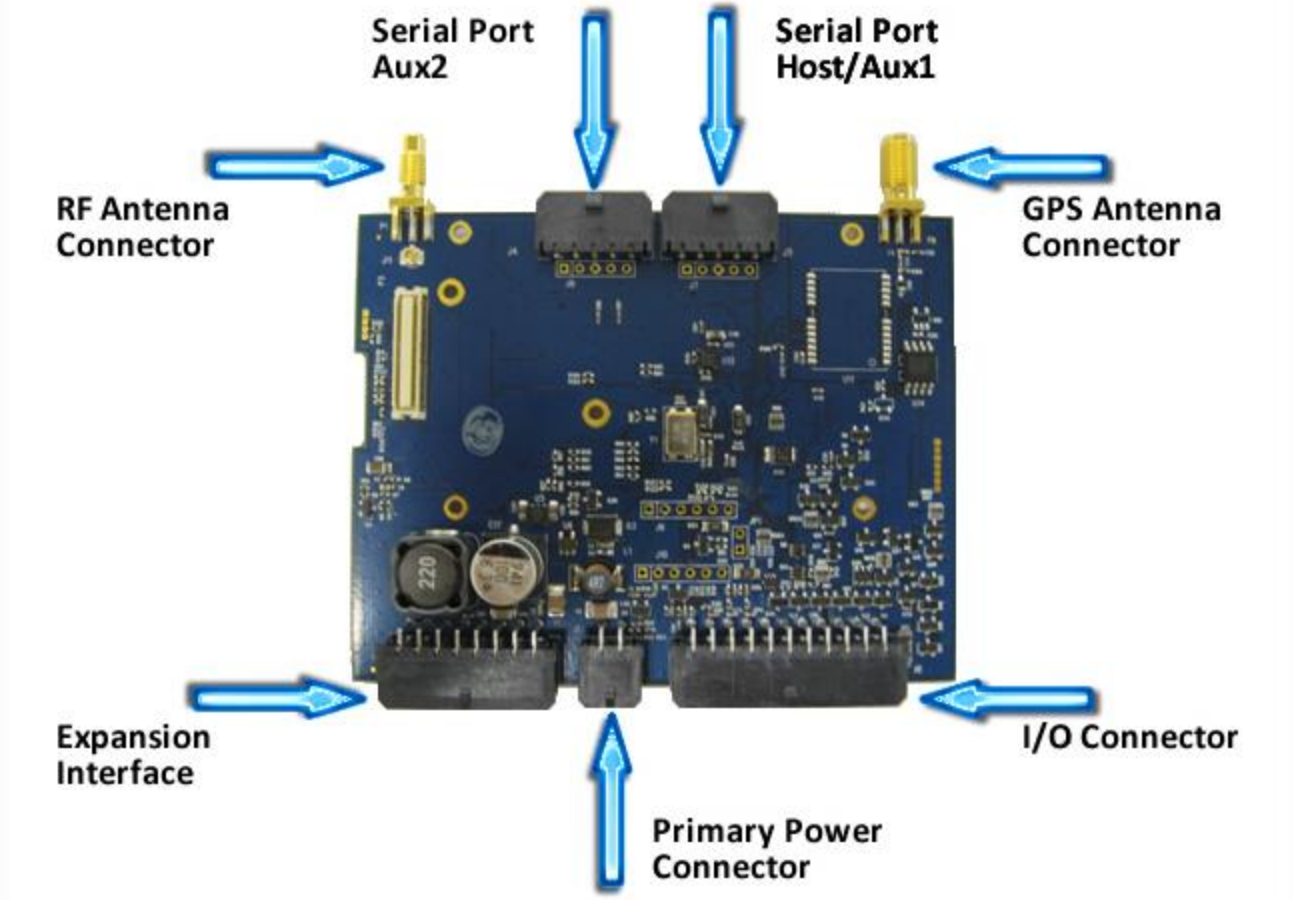
CALAMP Gama de producto

Arquitectura LMU 4200



CALAMP Gama de producto, LMU 4200

Arquitectura LMU 4200



LMU-42x0™ Connectors

CALAMP Gama de producto, LMU 4200

LMU-4200 Series – Environmental Spec

- **Size -** 4.8" long x 3.3" wide x 0.85" high
- **Weight -** 11 ounces.
- **Operating Temperature** -30° C to +75° C-10° C to +60° C (When using Internal Battery Power)
- **Storage Temperature** -40° C to +85° C0° C to +30° C (Long Term w/Internal Battery)
- **Internal Battery Charging Temperature** +5° C to +45° C
- **Humidity** 0% to 95% relative humidity, at 50° C non-condensing
- **Shock and Vibration -** Ground vehicle environment with associated shock and vibrationSAE Test: SAE J1455Mil Standard 202G and 810F

▪**Electromagnetic Compatibility (EMC)**
EMC compliant for a ground vehicle environmentSAE Test: SAE J1113 Parts 2, 12, 21 and 41

▪**Operating Voltage Range**
The LMU-42x0™ supports vehicles with 12 or 24 VDC systems including transients and electrical system noise; this includes ranges from 6 to 32 VDC.

▪**Electrostatic Discharge (ESD)**
No damage or performance degradation after the ESD disturbance.
SAE Test: SAE J1113 Part 13

▪**Power Consumption**
Average: 70mA at 13.8 VDC
Deep Sleep: 4mA
Sleep on Network (SMS): 10mA
Sleep on Network (GPRS): 20mA

CALAMP Gama de producto

LMU/RMU-4250 Series (Fleet Tracker)

Key Features

- LMU-4200 Features plus:
- J1708/J1939 Built-in Vehicle Engine Control Unit Interface
- Wifi Client Configuration (802.11b/g/i)
- Dual Wifi Client and Cellular modes

Wireless Technologies

- GPRS, CDMA 1X, HSPA, and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- External Antenna Configuration

CALAMP Gama de producto

LMU/RMU-4250 Series (Fleet Tracker)

Optional Features/Functions

Built-in Q9602 Iridium modem

Built-in J1939/J1708 vehicle bus reader

Built-in WiFi modem

External antennas (GPS, Cellular, combined GPS/Cellular)

Serial RS232 adapter cable

Connectorized I/O wiring harnesses

Comprehensive I/O

Ignition Inputs
1 (fixed low bias)

Digital Inputs
7 (selectable high/low bias, 0-30 VDC)

Digital Outputs
5 (open collector 200mA relay driver)
2 (20mA current source / LED drivers)

A/D Inputs
4 (0 - 30VDC, +/-0.1V accuracy)

1-Wire® Interface
Driver ID, temperature sense

Status LEDs
GPS and cellular

DIODE ELECTRÓNICA

CALAMP Gama de producto

BROADBAND CELLULAR ROUTERS AND GATEWAYS

CALAMP Gama de producto

LMU-5000 Series (Mobile Wireless Router, Gateway and Asset Management)

Key Features

- Linux Mobile Router w/ARM9 400MHz processor
- Base PEG64™ Behavioral Scripting
- 3 Axis Accelerometer for Motion Sense plus Hard Cornering, Braking, Acceleration, Impact Detection.
- Ethernet, Host USB and Client USB Interface
- 8 Inputs/7 Outputs/4 A-D /2 1-wire® Bus
- 1 RS232 Serial and 1 Switched Power Serial Ports
- 32 Programmable Geo-fences plus any combo of polygons up to 5400 points
- PULS ™ OTA Programming

Wireless Technologies

- HSPA, CDMA Rev A and SMS Messaging
- Super Sensitive GPS (-160dBm Tracking)
- External Antenna Configuration

CALAMP Gama de producto

CDM-5030 LTE/HSPA/EVDO Series

- 3G Linux Router/Gateway
- Linux 3 OS and user applications
- Secure IP router functionality
- Available with either a switched power RS232 serial port or 10/100 Ethernet port
- Reliable 3G/4G cellular performance
- Powerful ARM 926 400MHz embedded processor
- Advanced peripherals support
- Programmable I/O Interfaces
- Client USB interface
- Over-the-air configuration and firmware download

CALAMP-Certificaciones

- Regulatory Certification:
  - All units: PTCRB (GSM), CE Safety & CE emissions including:
    - CE Safety per EN 60950
    - Radiated Immunity per EN 61000-4-3
    - Conducted Emissions per EN 55022
    - Vehicle Transients per IEC 7637-2
  - As needed: based on business case e.g., TUV, A-Tick, ICASA
- Carrier Certs: (min, Vz, Sprint, AT&T, T-Mobile). Other certs as needed.

Calamp Plataforma de programación y gestión

PEG Scripting

The LMU 3030 is programmed using event based PEG Scripting. The tool in which you do the programming is called LMU Manager. LMU Manager is a graphical user interface that allows you to select how the LMU behaves depending on different events that occur. This tool will produce a CSV file that can be downloaded to the LMU device either serially or by connecting through PULS and updating Over-The-Air.

https://puls.calamp.com/wiki/PEG

https://puls.calamp.com/wiki/LMU_Manager_User%27s_Guide_V8.3

https://puls.calamp.com/wiki/PEG_Programming_Guide

PULS administration

The PULS website is a portal to all available LMU devices on your account. Here you can administer firmware updates and PEG script updates. The LMU firmware is designed to check in to PULS on a regular basis.

https://puls.calamp.com/wiki/PULS_User%27s_Guide

LMU Direct

When building your backend server to receive information from the LMU devices, the protocol that is used is called LMU direct. Your server will be required to parse the LMU direct packets as they arrive from the LMU device.

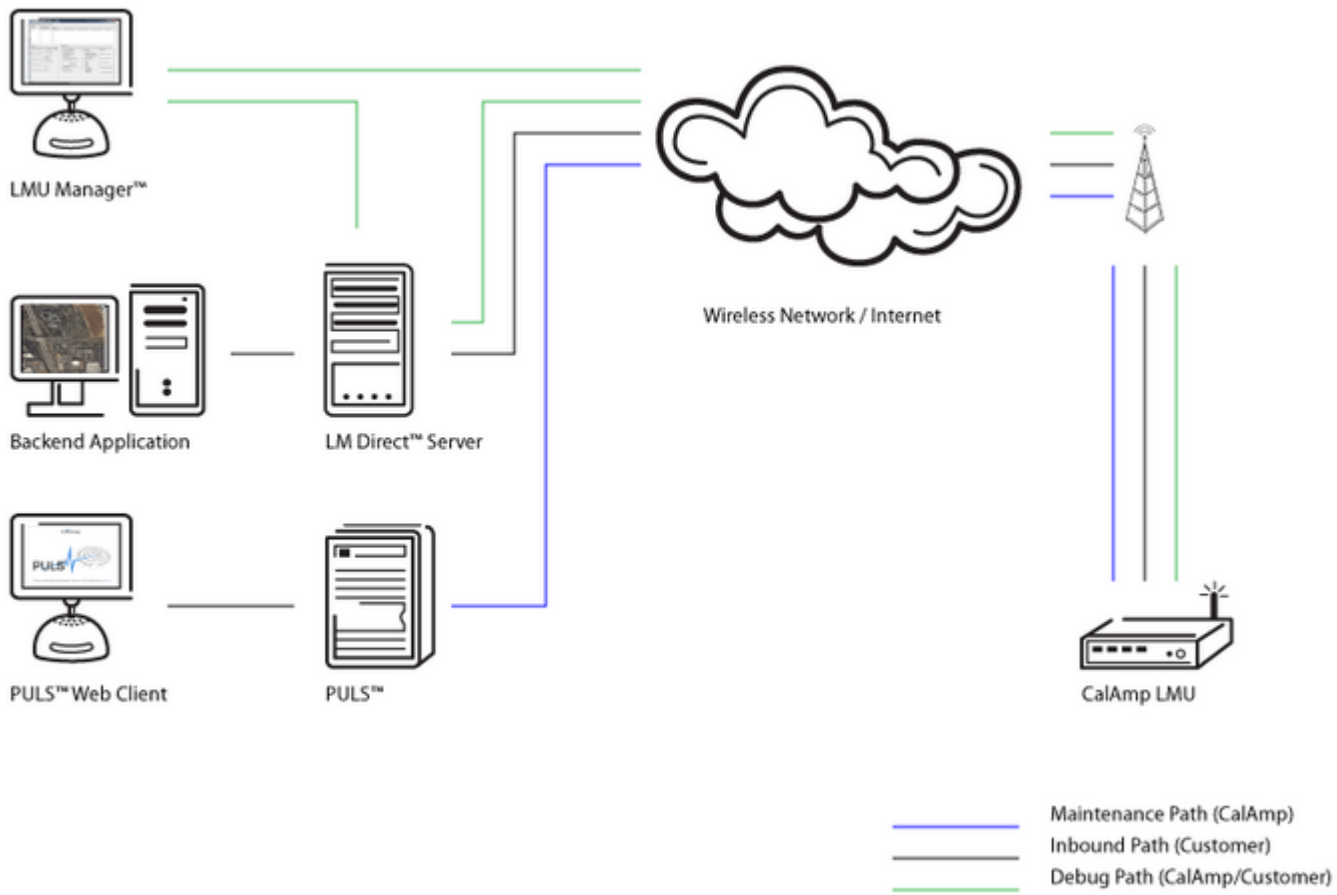
https://puls.calamp.com/wiki/LM_Direct_Reference_Guide

Electrical Specifications

To locally install the LMU device on your asset, please adhere to the electrical specifications.

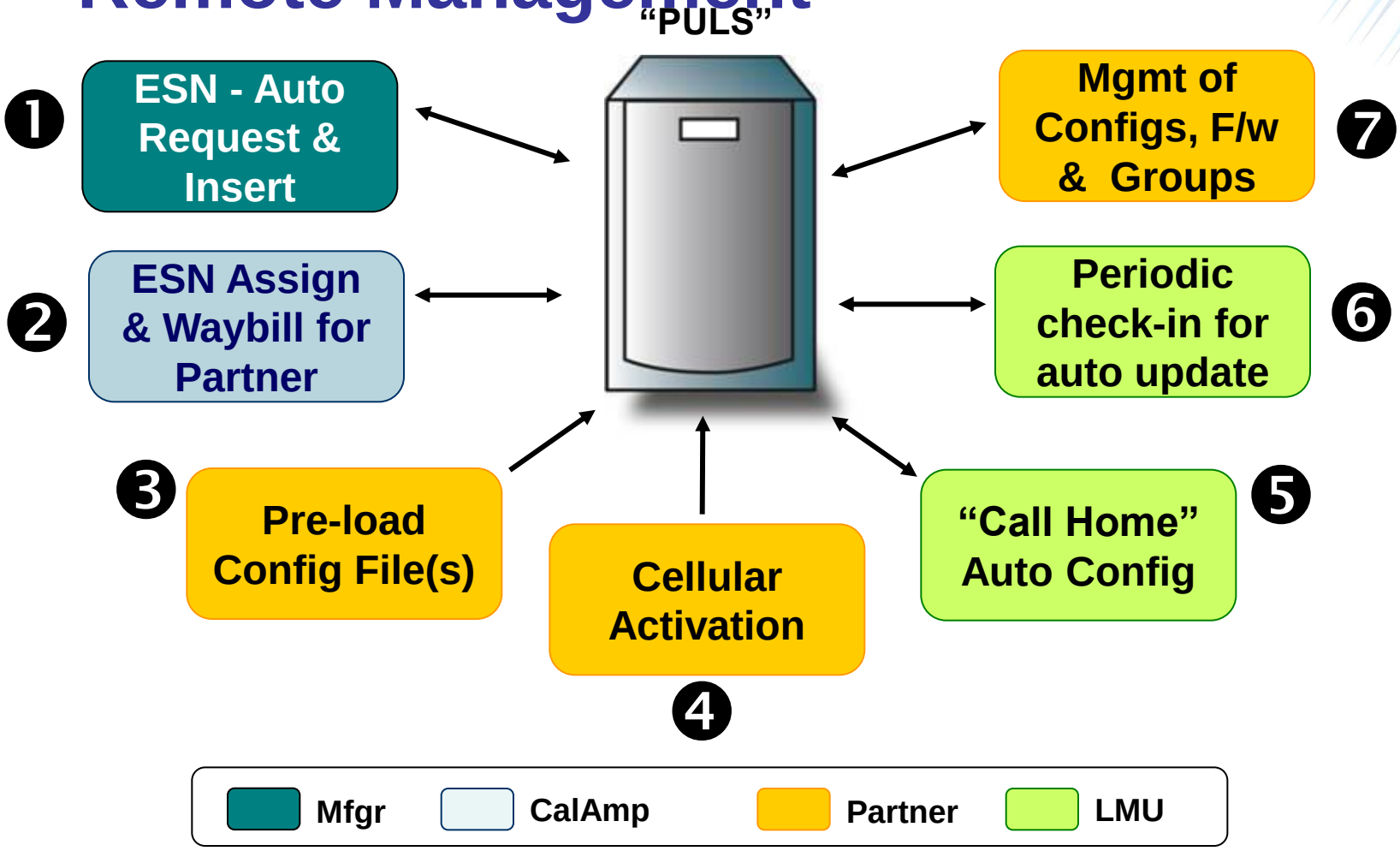
http://www.calamp.com/products/tracking-and-telemetry-devices/fleet-tracking-units/lmu-3030

Calamp Plataforma de programación y gestión



CALAMP plataforma de gestión

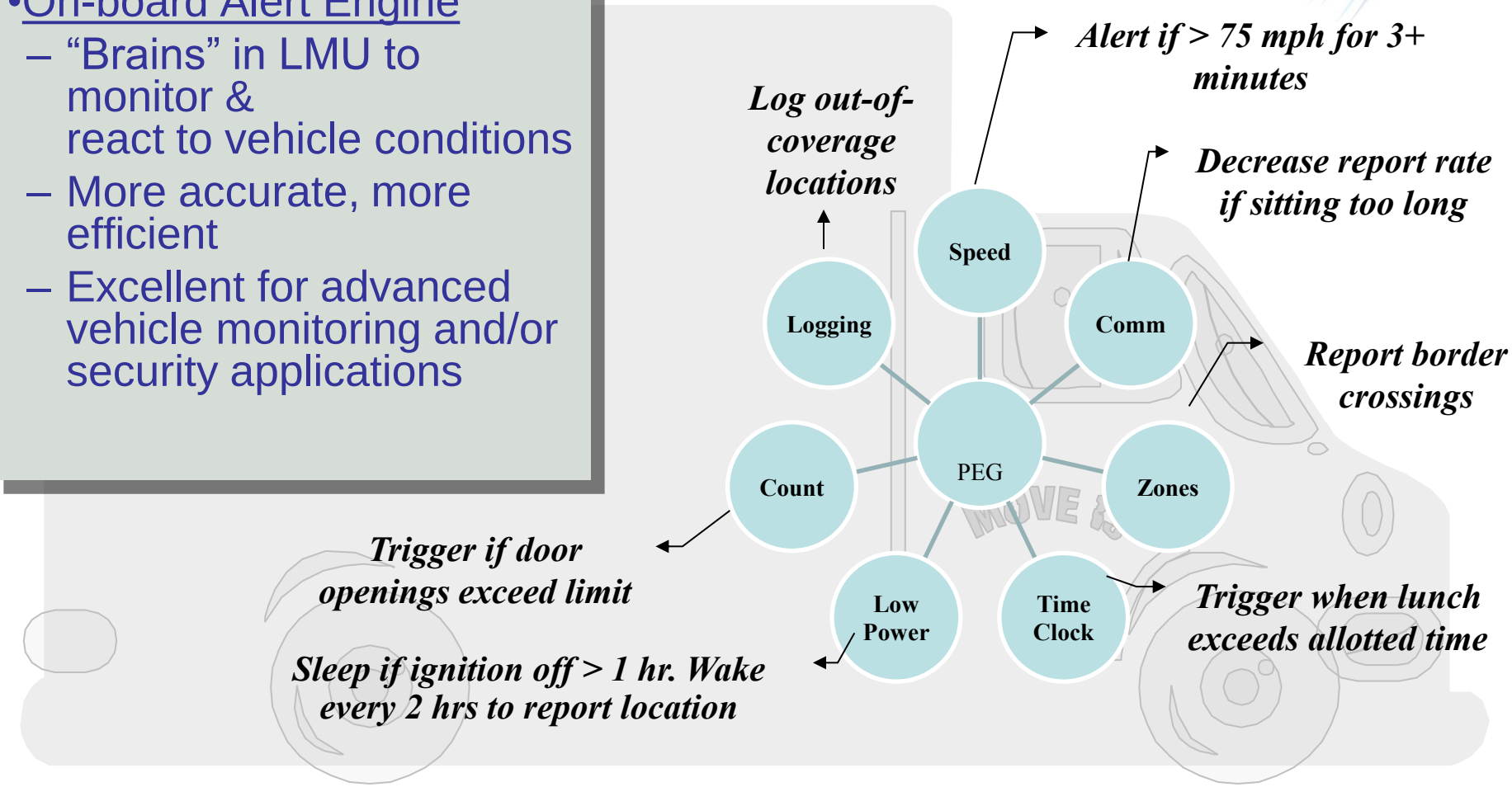
Remote Management



CALAMP- PROGRAMACIÓN PEG

Programmable Event Engine (PEG) Examples

- On-board Alert Engine
  - "Brains" in LMU to monitor & react to vehicle conditions
  - More accurate, more efficient
  - Excellent for advanced vehicle monitoring and/or security applications



CALAMP- PROGRAMACIÓN PEG

- PEG scripting overview

Programmable Event Engine (PEG)

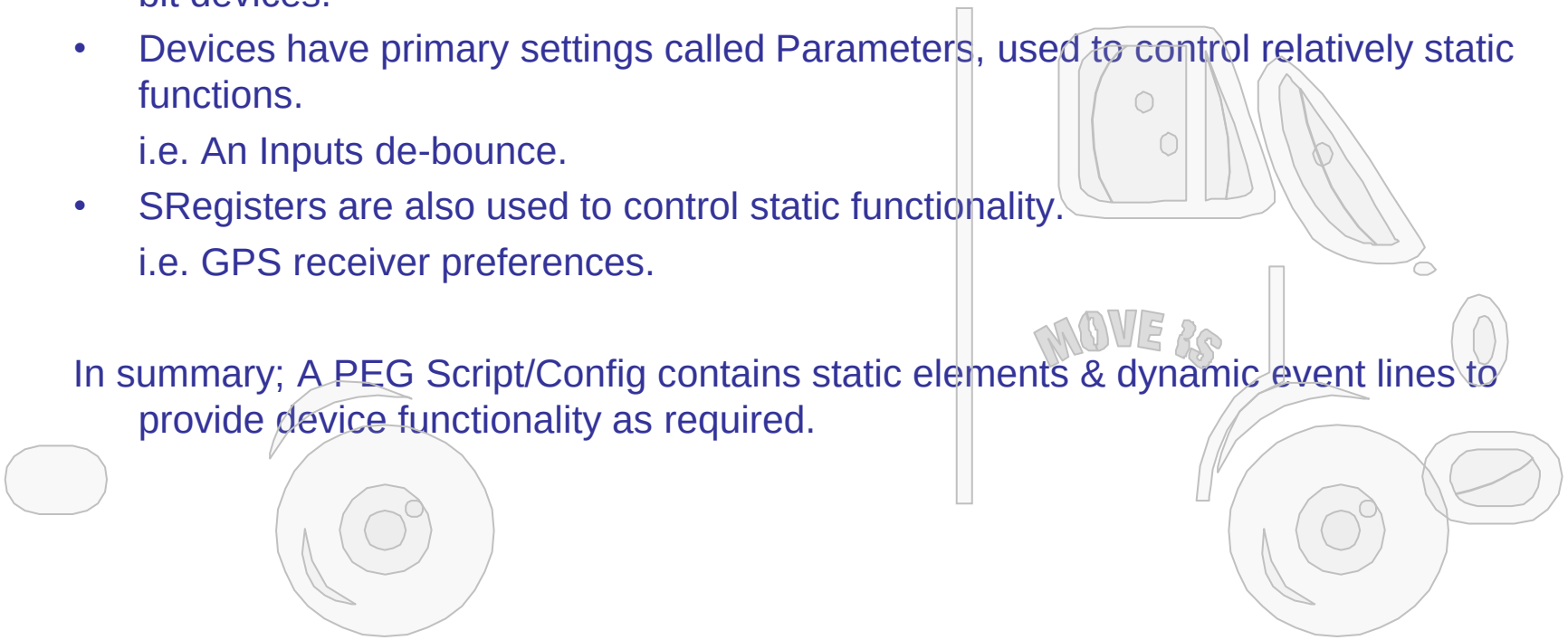
- A simple scripting language but with huge flexibility.
- Uses Triggers, Conditions & Action to form an Event.

  We add Triggers/Conditions/Actions to new Firmware as device capability is increased.
- 'Conditions' offers Boolean logic.
- Number of 'event' lines (lines of code) increases from 128 to 250 between 8 bit & 32 bit devices.
- Devices have primary settings called Parameters, used to control relatively static functions.

  i.e. An Inputs de-bounce.
- SRegisters are also used to control static functionality.

  i.e. GPS receiver preferences.

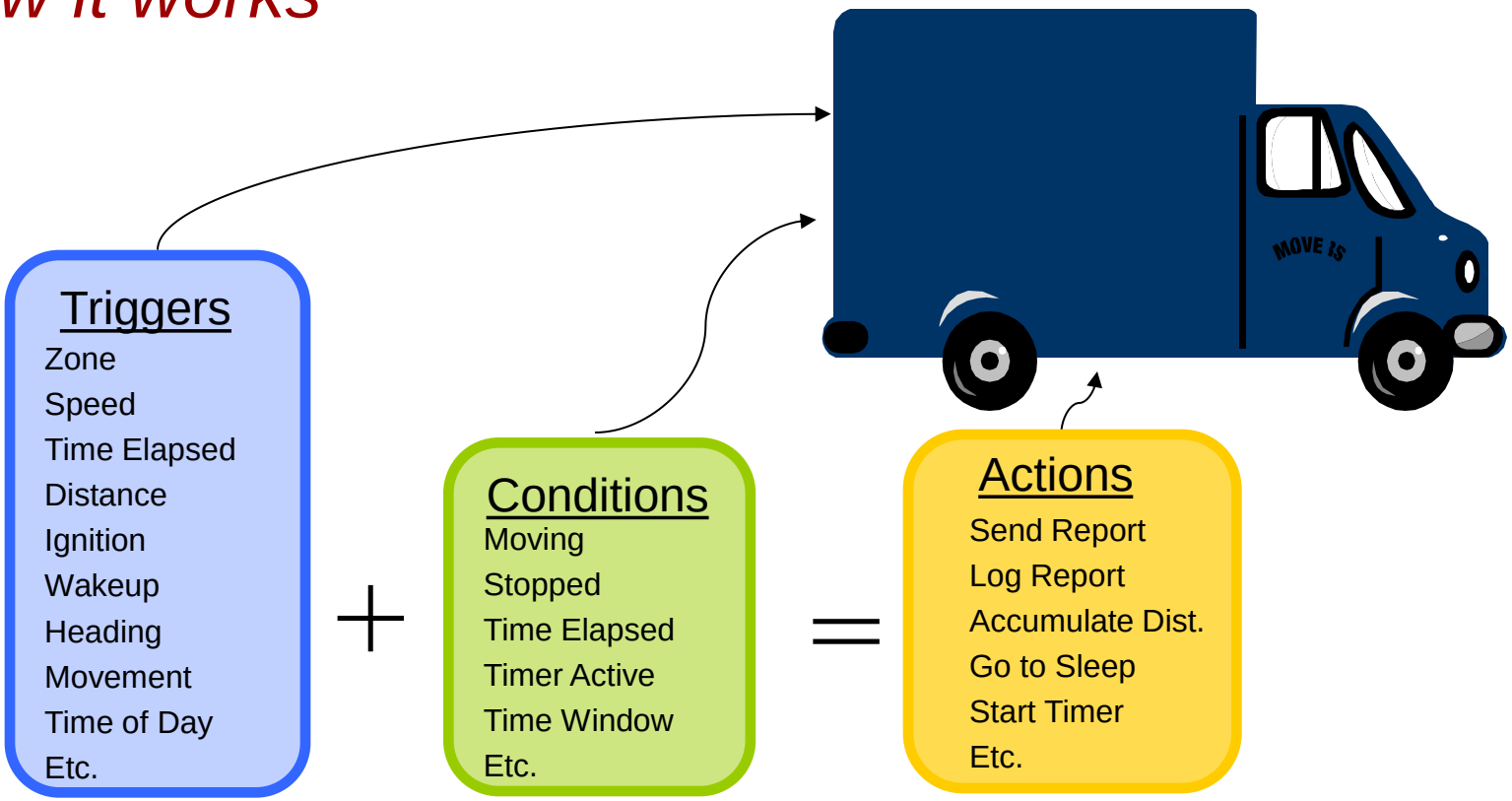
In summary; A PEG Script/Config contains static elements & dynamic event lines to provide device functionality as required.



Programmable Event Engine (PEG)

In-Device Intelligence:

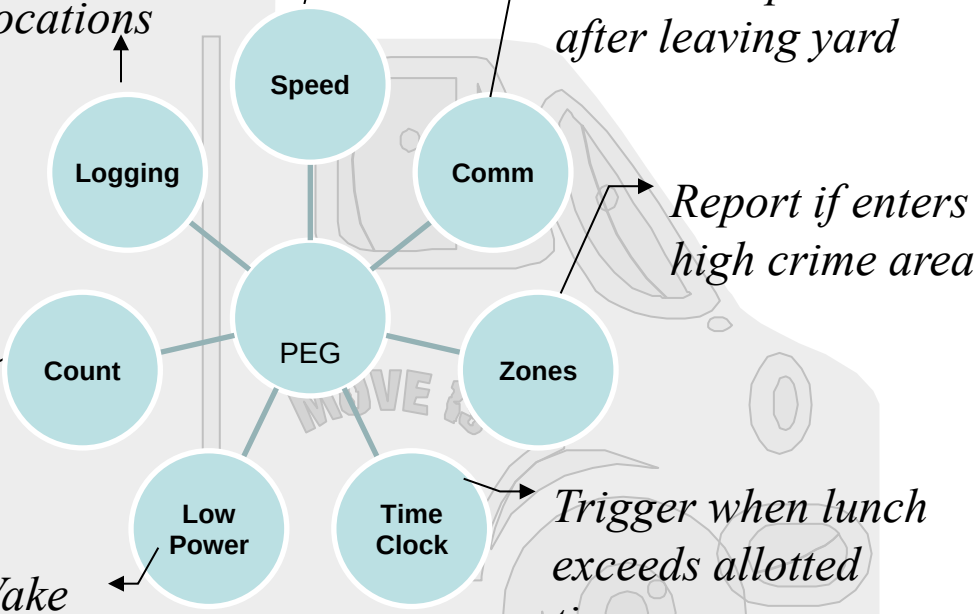
How it works



PEG - Examples

On-board Alert Engine

- "Brains" in LMU to monitor & react to vehicle conditions
- More accurate, more efficient
- Excellent for advanced vehicle monitoring and/or security applications



PEG - WIKI

1 PEG Triggers

Trigger Name	Trigger Code	Description	Trigger Modifier Definition
Timer Timeout	18	The timer value referenced by the Trigger Modifier has reached 0.	The index of the Timer value to monitor: 0 = Timer 0 1 = Timer 1

2 PEG Conditions

Condition Name	Condition Code	Description	Condition Modifier Definition
Moving	3	The LMU's current speed is equal to or above the value in the Moving Speed Threshold Parameter.	None
Not Moving	4	The LMU's current speed is below the value in the Moving Speed Threshold Parameter.	None

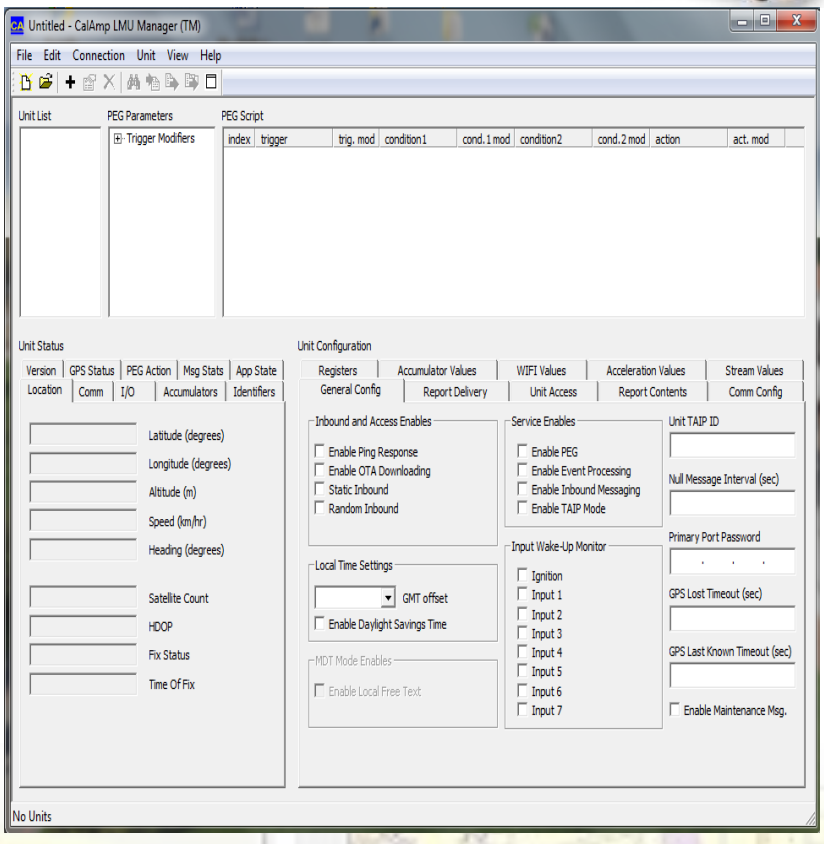
3 PEG Actions

Action Name	Action Code	Description	Action Modifier Definition
Send Report	1	The LMU will send an Event report with the Event Code value set to the Action Modifier. The message will be sent in Store and Forward Mode	The Event Code for the Event report (0-255)

Programmable Event Engine (PEG)

PEG – LMU Manager

- CalAmp provide a GUI (LMU Manager) to allow fast PEG Configuration writing.
- These Configs (.csv format) are then uploaded to PULS.
- PULS is then used to automatically download a Config. to field devices.



LMU Manager

It is a GUI with 5 main screen areas:

- Unit list
  - contains the LMUs that LMUMgr can communicate with
  - typically a single LMU defined with the ESN and may display the IP address after a successful GetUnitStatus
- Unit Status
  - Contains the last received status from the LMU you are communicating with
  - Mainly used to validate two way communication with the LMU
- PEG Parameters
  - Contains the values and thresholds used with the executing PEG Indexes
  - Things like Timer values, Speed Thresholds, TimeDistance values, etc
- PEG Script
  - Contains the executing portion of the PEG Configuration
  - The Triggers, Conditions and Actions portion of the PEG
- Unit Configuration
  - Contains settings for the LMU
  - Things like Timer IP:Port settings, SRegisters, Report Format settings etc.
  - Typical Tabs used in this area are::
    - Registers (incl S123 and S143 – PEG Config Ver x.y numbers)
    - Report Delivery
    - General Config

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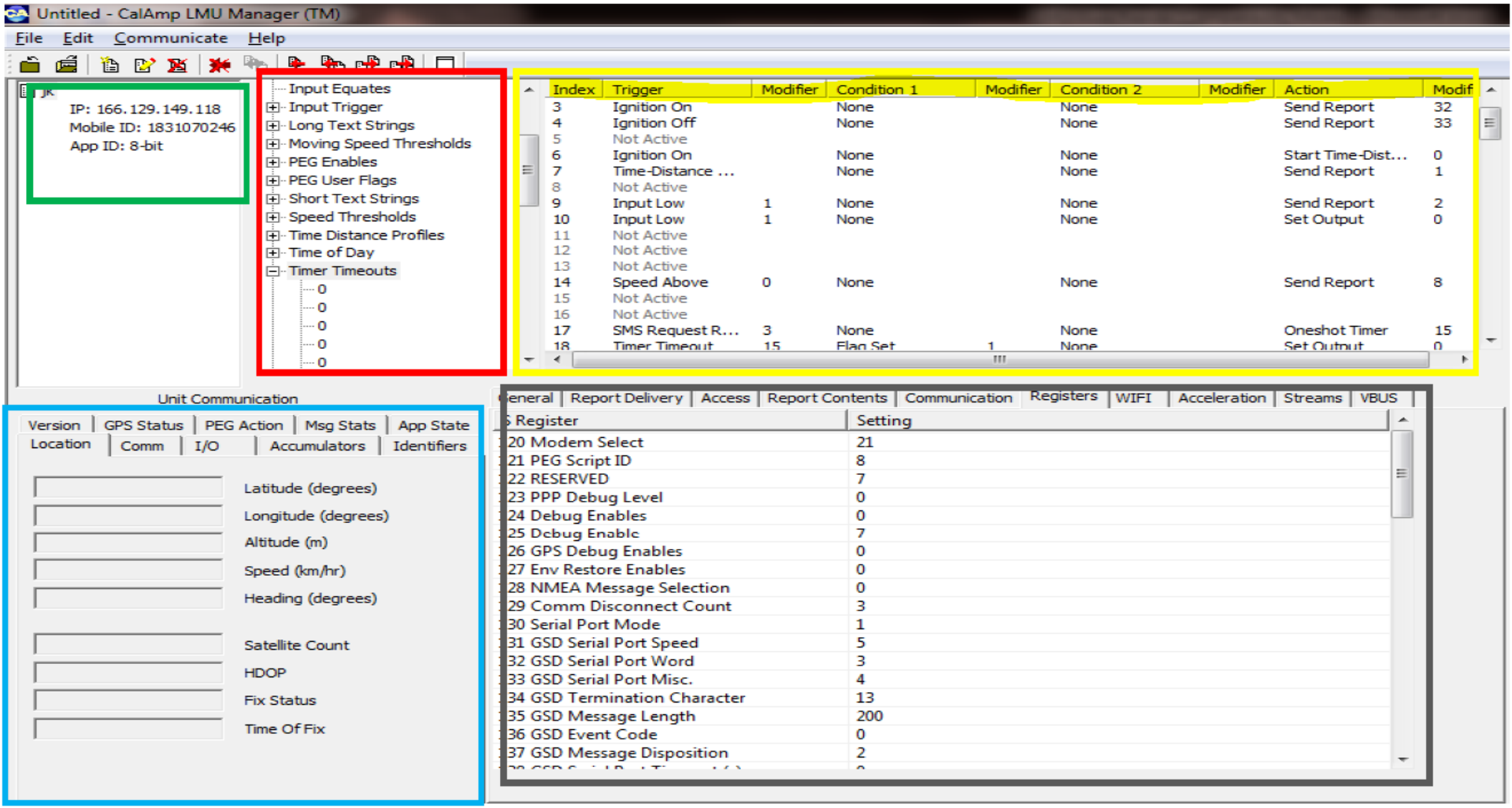
LMU Manager



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PEG –Example 1

- TTU-700 - Simple asset tracking demand.
- Single daily report.
- Maximum battery life is key.

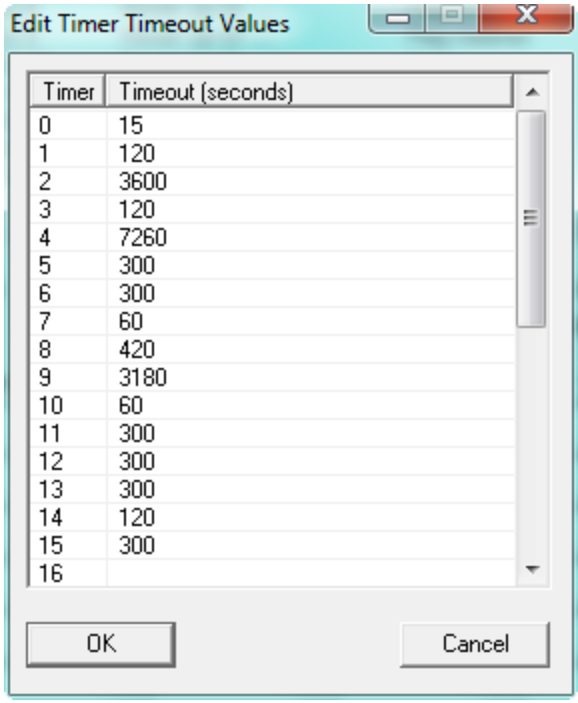
Untitled - CalAmp LMU Manager (TM)

File Edit Communicate Help

Index	Trigger	Modifier	Condition 1	Modifier	Condition 2	Modifier	Action	Modifi
0	Not Active							
1	Power Up Or Wake Up		None		None		Power Up GPS	
2	Power Up Or Wake Up		None		None		Oneshot Timer	1
3	Power Up Or Wake Up		None		None		Move A/D to Accumulator	0
4	Not Active							
5	GPS Acquired		None		None		Stop-Clear Timer	1
6	GPS Acquired		None		None		Log Report	55
7	GPS Acquired		None		None		Power Down GPS	
8	GPS Acquired		None		None		Comm Start	
9	GPS Acquired		None		None		Oneshot Timer	2
10	Not Active							
11	Comm Connected		None		None		Send Log	
12	Not Active							
13	Not Active							
14	Log Report Success		None		None		Save Environment	
15	Log Report Success		None		None		Sleep Until Time Of Day	0
16	Not Active							
17	Not Active							
18	Timer Timeout	1	None		None		Save Environment	
19	Timer Timeout	1	None		None		Sleep Until Time Of Day	0
20	Not Active							
21	Timer Timeout	2	None		None		Save Environment	
22	Timer Timeout	2	None		None		Sleep Until Time Of Day	0
23	Not Active							
24	Update Completed	0	None		None		Oneshot Timer	15
25	Timer Timeout	15	None		None		Restart Application	
26	Not Active							
27	Not Active							

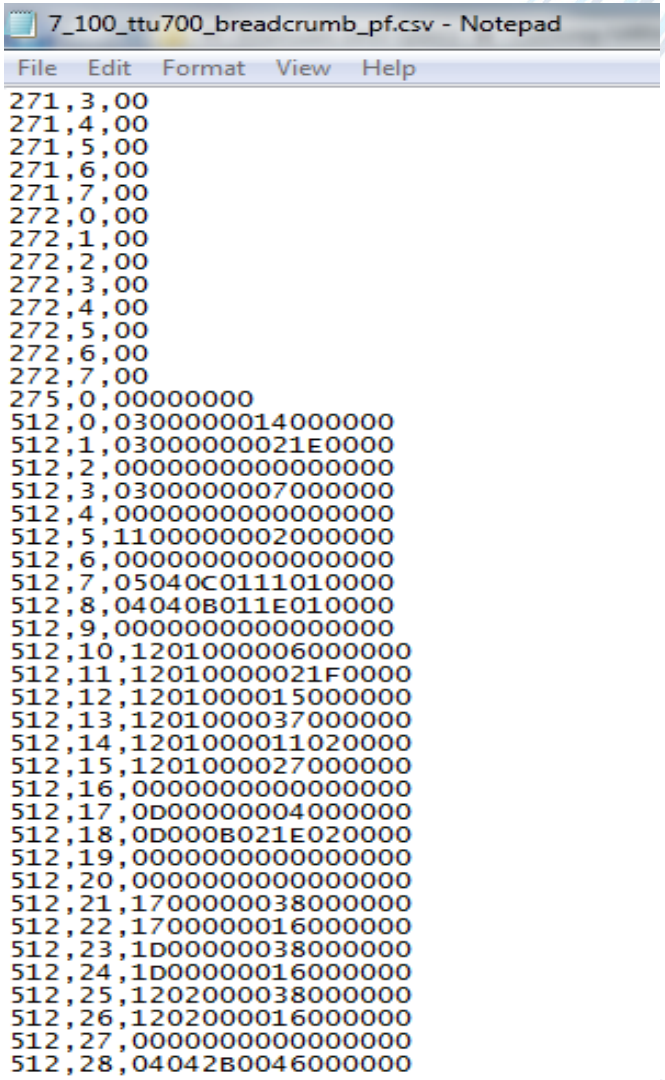
PEG Example 1 - explained

- ‘Time of Day’ parameter wakes TTU from deep sleep.
- GPS is powered then gracefully shut down once location is acquired.
- Comm is then powered, location report message sent.
- TTU is then put back to sleep on ‘message send success’.
- Limiting timers make sure GPS & GSM ‘try time’ can be controlled when GPS or GSM availability is limited.



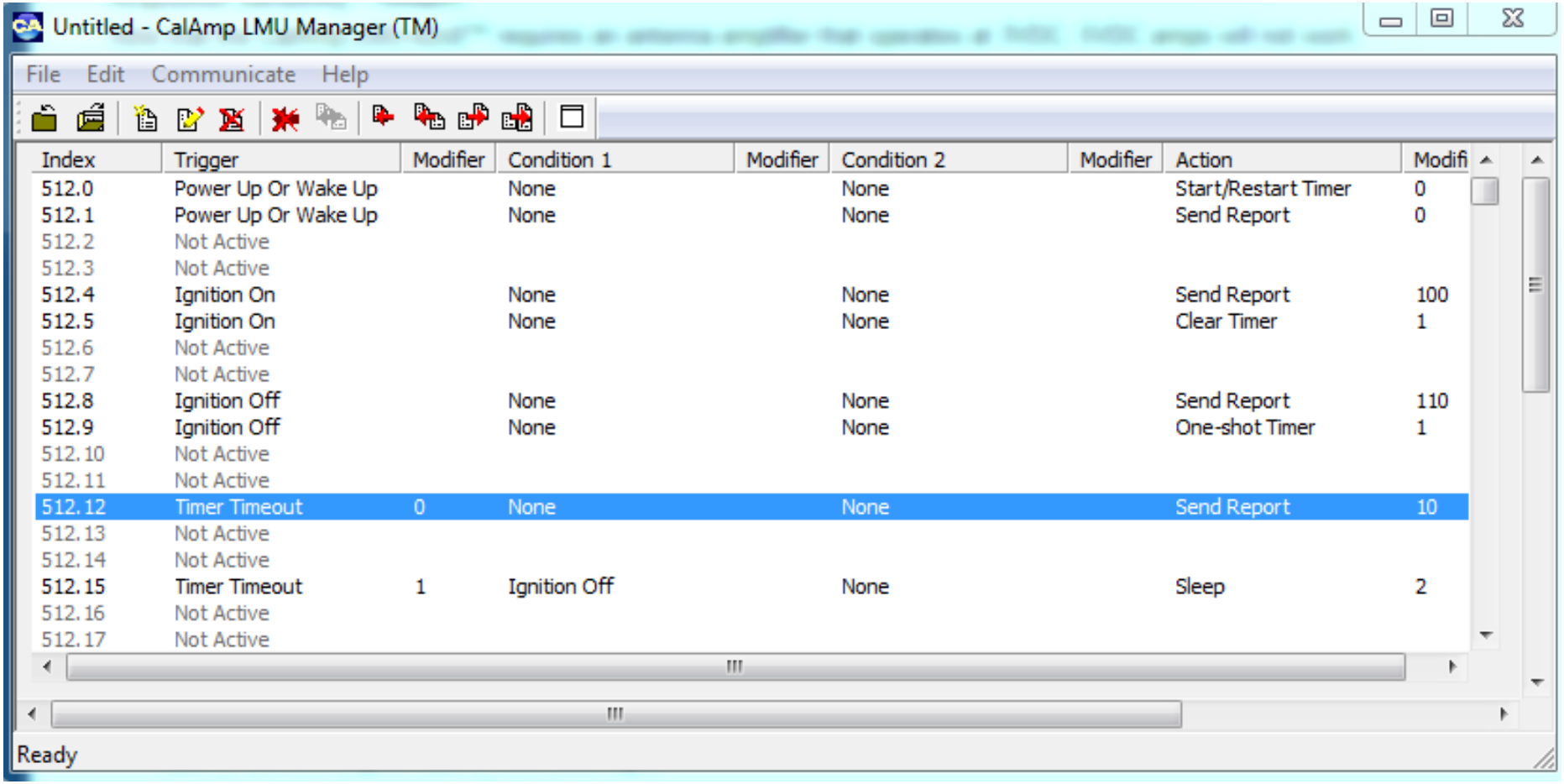
The config. file

- Exported from LMU Manager in .csv file format.
- Can contain all or some of the available configuration parameters.
- Uploads to PULS.
- Available to download to devices.
- Config. files tracked in PULS by allocation a unique ID & Version.



DIODE ELECTRÓNICA

PEG Script

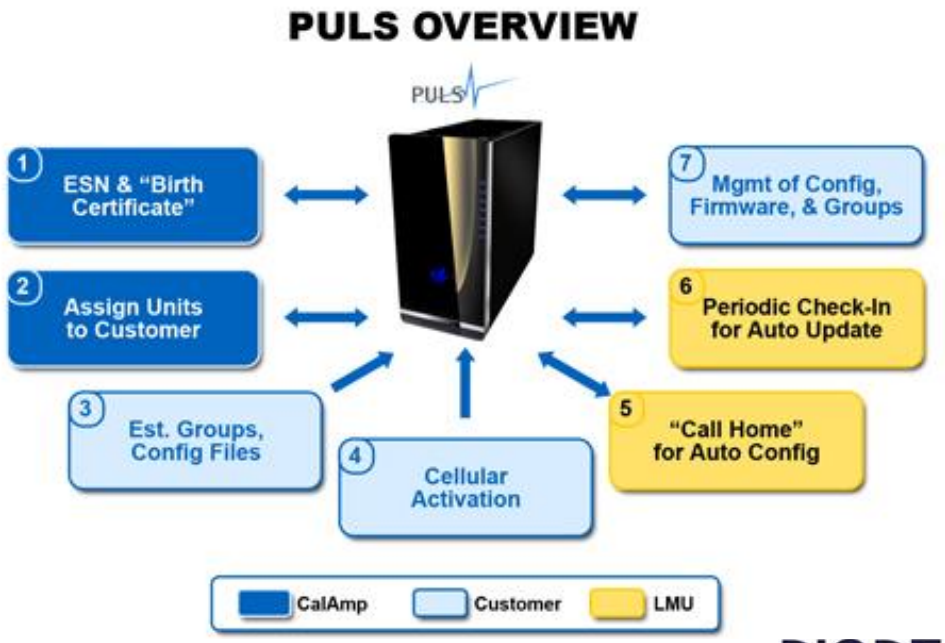

Untitled - CalAmp LMU Manager (TM)
File Edit Communicate Help
Index | Trigger | Modifier | Condition 1 | Modifier | Condition 2 | Modifier | Action | Modifi
512.0 | Power Up Or Wake Up | | None | | None | | Start/Restart Timer | 0
512.1 | Power Up Or Wake Up | | None | | None | | Send Report | 0
512.2 | Not Active
512.3 | Not Active
512.4 | Ignition On | | None | | None | | Send Report | 100
512.5 | Ignition On | | None | | None | | Clear Timer | 1
512.6 | Not Active
512.7 | Not Active
512.8 | Ignition Off | | None | | None | | Send Report | 110
512.9 | Ignition Off | | None | | None | | One-shot Timer | 1
512.10 | Not Active
512.11 | Not Active
512.12 | Timer Timeout | 0 | None | | None | | Send Report | 10
512.13 | Not Active
512.14 | Not Active
512.15 | Timer Timeout | 1 | Ignition Off | | None | | Sleep | 2
512.16 | Not Active
512.17 | Not Active
Ready

PULS, Provisioning, update and logistical system

- Server based solution that provides remote configuration, management and update services
- PULS is implemented on an enterprise-class server platform, running LINUX OS and includes a DB server, UDP communications manager, Web server and dedicated PULS daemon code
- Update one or thousands of devices in one instance

3 Primary Functions

1. Manufacturing & Operations Supp
2. Device Management & Configurati
3. Troubleshooting and Reporting



DIODE ELECTRÓNICA

What is PULS?

1. Manufacturing & Operations Support
   - Verifies the appropriate f/w is loaded
   - Verifies unit pass manufacturing tests
   - Assigns electronic serial number
   - Tracks product allocation to partners
   - Tracks shipping information

What is PULS?

1. Manufacturing & Operations (cont'd)
   - Stores LMU details
     - LMU Serial Number
     - ESN-D
     - MDN
     - MIN
     - Firmware Version
     - Configuration Version
     - Modem Type

What is PULS?

2. Device Management & Configuration
   - Web access for customer / service provider
     - Windows® Internet Explorer® 6.0 or greater
   - Customer manages organization of LMUs
   - Allows grouping, sub-grouping of units (e.g., end customer, vehicle type, etc)
   - Upload, storage, and identification of multiple configuration scripts per account

What is PULS?

2. Device Mgmnt & Configuration (cont'd)
   - Manages LMU scripts and/or firmware
     - Unit default configuration (from manufacturing)
     - Automatic, hands-free configuration for newly activated LMUs
     - Automatic, hands-free over-the-air script and config changes by group/sub-group
     - Automatic, hands-free over-the-air firmware changes by group/sub-group
     - Tracks status of over-the-air changes

What is PULS?

3. Troubleshooting and Reporting
   - Heartbeat message once/day (configurable)
   - Tracks status of deployed units
     - Time of unit last report (ID Report)
     - Tracks unit configuration
     - Tracks dynamic IP (ID Report)
     - Tracks unit firmware version
     - Provide device health information

What is PULS?

3. Troubleshooting and Reporting (cont'd)
   - Provide device health information
     - GPS Status
     - GPS Antenna Status
     - Configuration Assignment
     - Last Report Time
     - Last Config Change Time
   - Records LMU Reports (Event Report, ID Report, User Message) in a standard csv file for evaluation and integration purposes
   - Exception Reporting (future)

LM Direct Overview

- The LM Direct™ interface was designed as a means for an LMU to provide location and status information to an application without requiring the LM Exchange middleware.
- It also allows the application to read and write the LMU's configuration parameters including the PEG event list and trigger parameters.
- These applications typically will take one of two forms: Either an in-vehicle application running on a laptop (or PDA) or a management/tracking application on a back-end system.

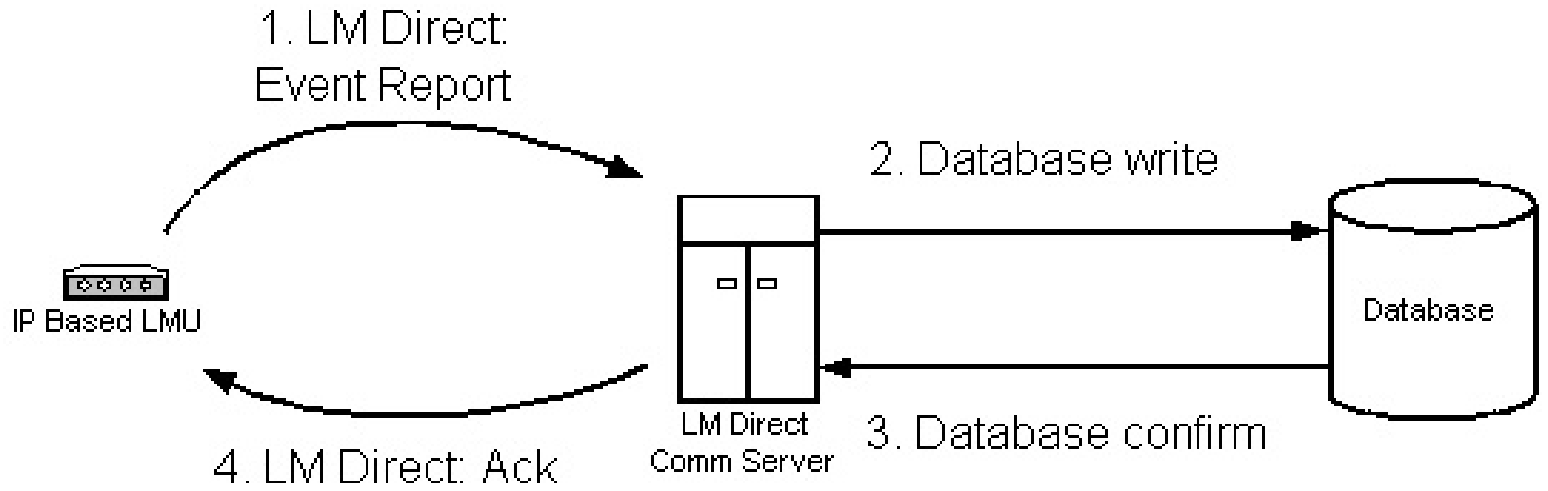
LM Direct Overview

- LM Direct™ provides the following features and capabilities to an application:
  - Location Data — Time-of-Fix, Latitude, Longitude, Heading, Speed, Altitude, HDOP, Number of Satellites and Fix Status
  - Communications Data — Signal Strength (RSSI), Comm State and Carrier/Operator Identifiers
  - LMU Data — Mobile ID, Event Code, Event Index, Event Timestamp, Report Sequence Number, Input States, and Accumulator values.
  - PEG-based event reporting
  - User messaging between the application and a serial device attached to the LMU
  - Full programming of the LMU's PEG functionality
  - Full programming of other LMU configuration parameters
  - Acknowledgement and retransmission functionality
  - Optional logging of event reports and user messages in the LMU when delivery to the application isn't possible

LM Direct - Communication

The LM Direct™ interface in the LMU listens on UDP port 20510 for any requests generated by the application; that is, all outbound messages (i.e., those sent to an LMU) are sent to port 20510. Responses to outbound messages (e.g., ACK/NAK messages) are sent back to the originating IP address and port. Inbound request messages (e.g., Event Reports, User Messages) are sent by the LMU to the IP address and port currently selected from the Inbound Routing List. Typically the application will listen for these messages on port 20500.

Event Report Message Flow



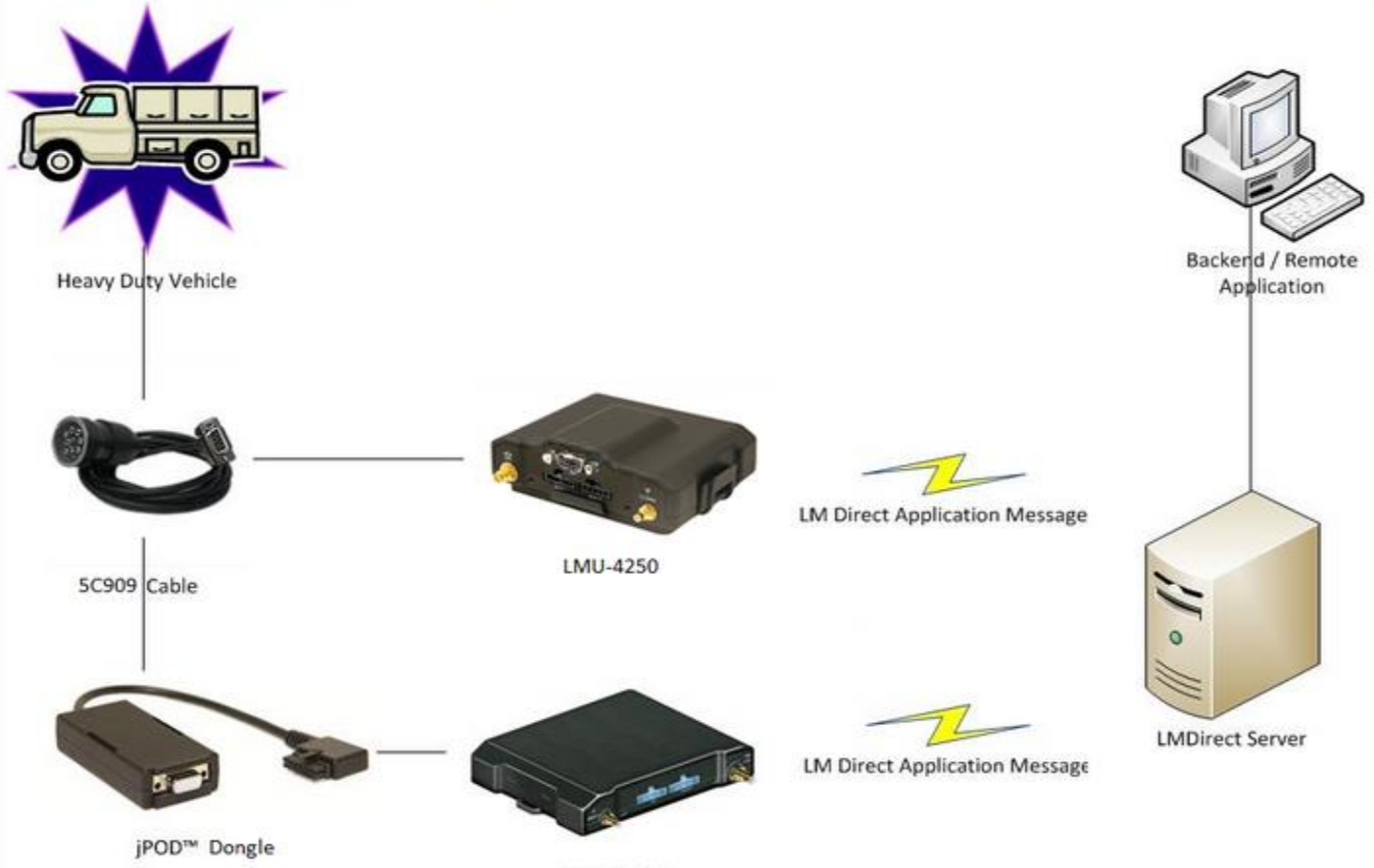
1. The LMU creates an Event Report based on its PEG script and sends it to the LM Direct™ Comm Server
2. The LM Direct™ Comm Server receives, interprets and writes the contents of the Event Report to the database
3. The database confirms the write operation
4. The LM Direct™ Comm Server sends an Acknowledge Message (Message Type 1) to the LMU. This message is sent only if the Service Type of the event report is 0x01 (e.g., Acknowledged Request).

Accesorios

jPOD adapter for detecting and measuring CAN parameters J1939 and J1708.
Daughter Board connection with the LMU-4250
Expansion Dongle on the expansion port of the LMU-4200
5pin Serial (Aux1 or Aux2) Dongle on LMU-2610 and higher devices.

System Architecture

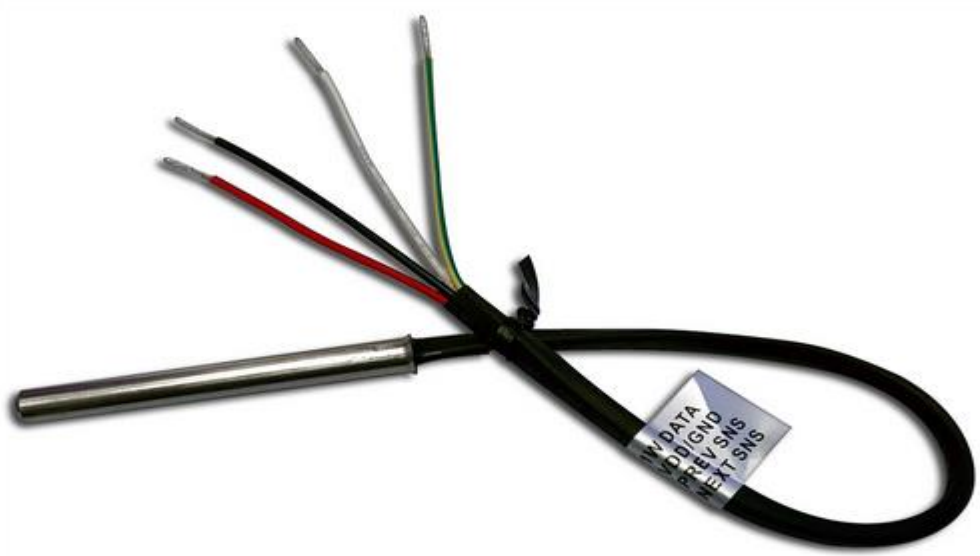
A typical jPOD™ installation will approximate the following block diagram.



Accesorios

Temperature Sensor(s) – 134385

The 1-Bit Bus will need to be enabled in the settings of S-Register 171. Setting bit-0 will enable the 1-Bit Bus operations, and bit-6 will configure the 1-Bit Bus for use with a temperature sensor.



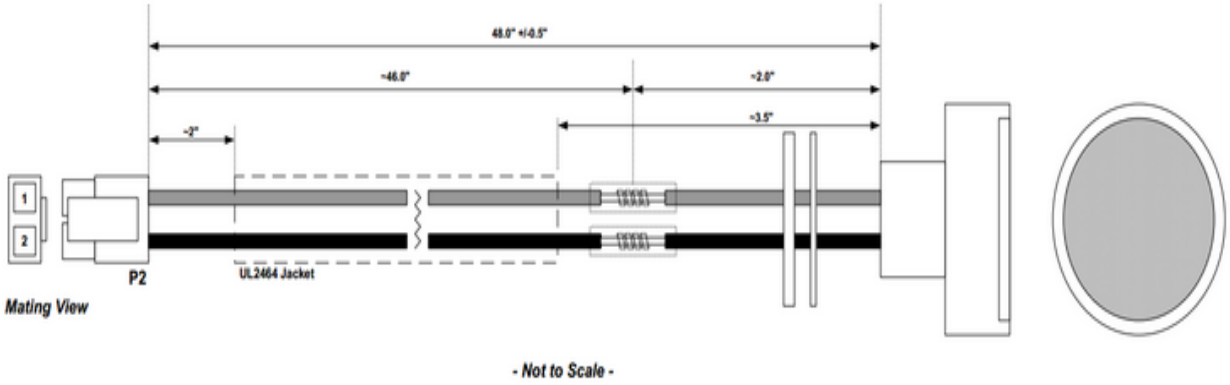
Accesorios

iButton Reader - 4C763

Part Number 4C763: iButton Reader and Cable Assembly. The iButton reader can be used with the iButton keys to identify the driver.

The 1-Bit Bus will need to be enabled in the settings of S-Register 171. Setting bit-0 will enable the 1-Bit Bus operations.

To install the iButton it must be connected to the 1-Bit Bus interface. If the wiring harness does not have the 2-pin connector the data and ground pins of this accessory can be attached to the associated wires on the LMU. The key values can then be read by the unit using 1-Bit Bus ID to Accumulator (71) PEG Action, the value will be written to 2 accumulators defined by the action modifier.

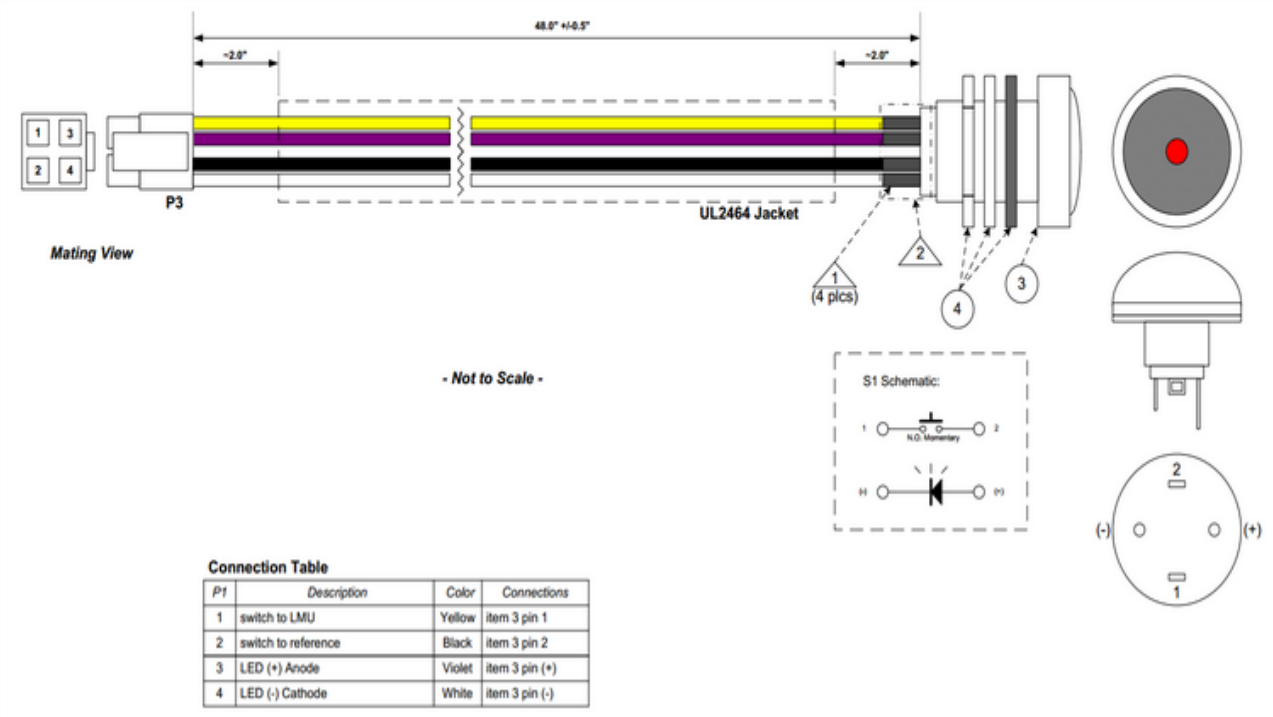


Accesorios

Switch/LED button - 4C764

Part Number 4C764: Switch LED Cable Assembly. The Switch LED button is most commonly used as the Panic Button. The LED in the middle of the button can also be used to notify the driver of different events depending on the script.

The Switch LED button has its own designated power and ground cables that must be connected to the power and ground wires from the LMU. The output cable must then be connected to the desired output that will be used to control the LED. The input must then be connected to the desired input that will trigger when the button is pressed. When using this accessory with the 5C260 the LED is controlled by Output 2, and Input 3 is controlled by the switch/button. PEG Actions that can be used to control the LED include: Set Output (8), One-shot Output (10), Blink Output at 1Hz (11), Blink Output at 4Hz (12), and Multi-Pulse Output (80). The switch/button can be monitored by the PEG Triggers Input High (4) and Input Low (5).



Connection Table

P1	Description	Color	Connections
1	switch to LMU	Yellow	item 3 pin 1
2	switch to reference	Black	item 3 pin 2
3	LED (+) Anode	Violet	item 3 pin (+)
4	LED (-) Cathode	White	item 3 pin (-)

Switch LED Cable Assembly

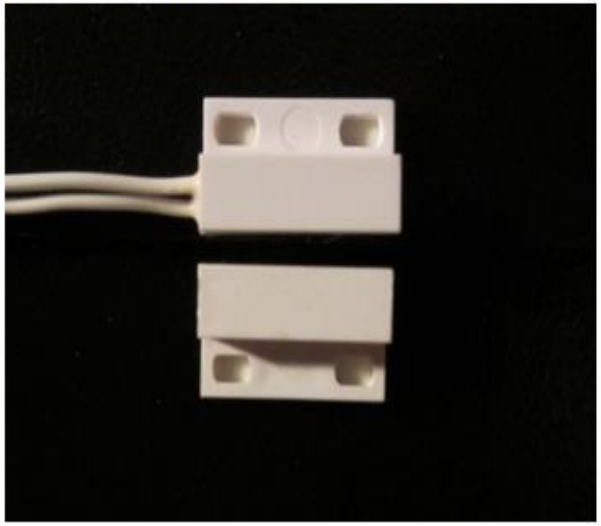
Accesorios

Door Sensors

Door sensors are commonly used with our products to monitor door activity. These sensors can be monitored by the PEG Triggers Input High (4) and Input Low (5). When available the bias of the input can be configured with S-Register 158 to work with the sensor.

Most door sensors utilizes 2 wires, one to be connected to the input of the Calamp device, and the other used as a Ground signal. In this case the input will need to be biased high. When the sensor is active it will pull the Input low and fire the Input Low (5) Trigger, and when the sensor is inactive the Calamp Device will pull the input back to the high bias and fire the Input High (4) Trigger.

Calamp does not sell these sensors directly, but the sample shown below can be found at HeitechCS.com



Accesorios

Seat Belt Sensors

Seat belt sensors are commonly used with our products to monitor that the seat belt has been engaged during a trip. These sensors can be monitored by the PEG Triggers Input High (4) and Input Low (5). When available the bias of the input can be configured with S-Register 158 to work with the sensor.

Most seat belt sensors utilizes 2 wires, one to be connected to the input of the Calamp device, and the other used as a Ground signal. In this case the input will need to be biased high. When the sensor is active it will pull the Input low and fire the Input Low (5) Trigger, and when the sensor is inactive the Calamp Device will pull the input back to the high bias and fire the Input High (4) Trigger.

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